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**A STUDY OF COLLEGE INSTRUCTOR ACCEPTANCE
OF AN INNOVATION AS RELATED TO
ATTRIBUTES OF INNOVATION**

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Mahmood Moallemian

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**A STUDY OF COLLEGE INSTRUCTOR ACCEPTANCE
OF AN INNOVATION AS RELATED TO
ATTRIBUTES OF INNOVATION**

**By
Mahmood Moallemian**

A DISSERTATION

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ABSTRACT

A STUDY OF COLLEGE INSTRUCTOR ACCEPTANCE OF AN INNOVATION AS RELATED TO ATTRIBUTES OF INNOVATION

by

Mahmood Moallemian

This study is an exploratory examination of perceived characteristics of an innovation with regard to its acceptance within the Educational Development Program (EDP) at Michigan State University. Attributes of innovations identified by Rogers and Shoemaker in Communication of Innovation (Relative advantage, Compatibility, Trialability, Complexity and Observability) were considered to be tested in terms of their relative significance in this educational setting as perceived by the faculty coordinating EDP projects.

The study was designed to (1) contribute to developing theory of diffusion in education, (2) develop an instrument to collect data for measuring the relative significance of the set of perceived attributes of innovations identified by Rogers and Shoemaker, (3) provide a practical framework by which characteristics of innovations in education may be described and analyzed, and (4) measure the degree to which these attributes are perceived in relation to predictions of the acceptance of the innovations. In order to achieve these objectives, a measurement instrument was developed to collect faculty's perceptions of the EDP projects at Michigan State University.

The study also focused on life span and stability of the projects under study and their relationship to the attributes. Life span and stability of the projects were tested in terms of their continuation/discontinuation and degrees of acceptance (high/low) as perceived by the respondents.

A practical framework was developed, using generalizations provided by Rogers and Shoemaker and reviewing educational research and nonresearch reports on diffusion of innovation in order to collect a set of sub-attributes common in this literature which may be useful for future studies on attributes of innovations in education.

Analysis of data revealed that only two out of five attributes (Relative advantage and Trialability) were perceived to be significant in EDP projects and the other three attributes (Compatibility, Complexity and Observability) were not perceived to be significant. Furthermore, the two attributes, Relative advantage and Compatibility, had a significant effect on continuation of the projects and the degrees of perceived acceptability of the projects by the respondents. Several sub-attributes were found to be important in the acceptance of educational innovations. These sub-attributes should serve as a base for development of a new set of attributes based on educational research.

**To my wife Dokhi
and
my children
Mercedeh and Mehriar**

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CHAPTER I

THE PURPOSE OF THE STUDY

Introduction

This study is an exploratory examination of perceived characteristics of an innovation with regard to its acceptance within the Educational Development Program at Michigan State University.

This chapter sets forth the problem and significance of the study. In addition, a definition of terms and rationale for selecting the setting for this study is included. Limitations and procedural assumptions are reviewed.

Chapter II will present a selective review of the relevant literature on diffusion theory, organizational change, funding of change projects and effects of type and size of change projects. Chapter III will include a report on what was done to conduct the study, i.e., the methodology. Analysis of the data are presented in Chapter IV; and in the final Chapter V, the data are compressed and summarized, and conclusions and recommendations are presented for further study regarding perceived characteristics of innovations.

Problem

Nicholas France recently received his college diploma at the age of 27--without ever having gone to college. He studied on his own, passed an examination that proved he knew as much as a college graduate, and received a degree. He made it. Total cost for his education: about \$410. (Gross, 1976. p.6)

The alternative movement in higher education seeks to provide a variety of options and facilitate higher learning for people of all ages and conditions of life. Through such innovations, institutions of higher education attempt to serve a diverse student body, reduce costs, increase satisfaction, and utilize technological facilities that are changing at an accelerating pace.

According to Gross (1976), Open Learning, Nontraditional study, the External Degree, and the Extended (or Expanded) Campus are symbols of this movement in higher education. He mentions "literally hundreds of colleges and universities throughout the country are currently experimenting with such programs, and even more have them on the drawing boards. At a time (i.e. of economic upheaval) when most colleges are cutting back, this is an area that is expanding." (p.7)

With this rate of innovation and change, we can also see that every year thousands of innovations fail in educational settings. In fact, educational institutions are not recognized for their receptivity to change. A classical example of this is given by Snow:

In a society like ours, academic patterns

change more slowly than any others. In my lifetime, in England, they have crystallised rather than loosened. I used to think that it would be about as hard to change, say, the Oxford and Cambridge scholarship examination as to conduct a major revolution. I now believe that I was over-optimistic. (Snow, 1961, in Miles, 1964.)

The same voice may be heard today. In a review done by Orlich, (1979) he cites Aslin and DeArman's study of 33 innovations (1976) and mentions:

...68.4% (of innovations) were never tried, 14.6% were being tried on a limited basis, 14.7% were fully implemented and operational, while 2.3% of the responding school officials stated that they tried selected innovations but abandoned them. (Aslin and DeArman, in Orlich, 1979. p.5)

Why are some innovations not accepted? Walker (1976) believes many ideas are never implemented because of their own limitations and incompatibilities. Other ideas fall short of implementation due to improper diffusion strategies and misjudgements of their acceptability. Frequently, the human element plays the dominant role in the acceptance or rejection of an innovation, with the value of the innovation itself considered as being of secondary importance.

The failure of educational innovations according to Miles (1965) are two: (1) Substantive failure, which is related to the characteristics of the innovation itself and (2) Adoptive failure, which is related to the quality of its implementation.

Most available literature on change and innovations

deals with adoptive failures related to people and system characteristics. Little attention is paid to the characteristics of innovation itself. This is traceable in a bibliography compiled by Havelock and his group in the Center for Research on Utilization of Scientific Knowledge, (CRUSK) at the University of Michigan, Institute for Social Research. (1969)

Orlich (1979) in his article lists thirteen rules for successful implementation of innovation related to adequate planning, administrative support, teacher preparation, availability of resources, political process..... His list is supported by about 40 studies, including those conducted by Rand Corporation between 1973 and 1978, in eight volumes, the Ford Foundation study of 1972, as well as studies by Miles (1964), Carlson (1965), Rogers (1962), Mort (1964), Greenwood et.al., (1975), Watson (1967), and many others.

This study is an attempt to investigate the relationship between the specific characteristics of innovations, presented by Rogers, and acceptance of innovations by project directors and codirectors of a selected sample of Michigan State University's Educational Development program during the years of 1975-1979.

Several writers have argued that what is needed in education is a classification scheme for innovations (Carlson, 1965, p.3). Such a scheme would make it possible to conceptualize and explain acceptance and rejection of innovations in terms of higher order common properties of innovations.

As yet, the literature fails to reveal a taxonomic scheme for innovations that are specific to the field of education. However, there are typologies which have been developed in other research traditions and which do take into account general attributes of innovations. Rogers and Shoemaker's (1971) work is notable in this regard.

Rogers and Shoemaker's typology identifies five basic characteristics of innovations: Relative advantage; Compatibility; Complexity; Trialability; and Observability (p.137). These will be considered as the main variables of this study. The reason for selecting Rogers and Shoemaker's model is that the attributes presented by these authors appear to be the original elements for other models presented later. Some lists of attributes might go into subattributes but they serve as a function of the original five. Therefore, the validity of these attributes for application to educational purposes must be questioned.

Significance of the Study

"Although much of the impetus for change in educational organizations stems from external sources, it is generally acknowledged that administrators are crucial in introducing innovations at the local level" (Miles, 1964). At college settings, deans and chairpersons are in the strongest position for changing or maintaining the status quo. However, these authorities must still rely on the classroom instructor to implement innovations, which suggests an unintended source

of power for this role. The instructor is capable of exerting considerable control over the destiny of an innovation. Instructors can enthusiastically accept change and work hard to promote its implementation; they can display an indifferent attitude toward a new idea, or even sabotage an innovation if they are not convinced of its utility. Kritek (1976), in his article reviewing the change literature, cites several studies dealing with the implementation process. It partly reads:

Carlson, in his chapter on the unanticipated consequences in the use of programmed instruction, catalogued teacher strategies devised "to modify programmed instruction in such a way that it took on more of the characteristics of regular classroom instruction." Similarly, Goodlad and Klein noted that "novel features seemed to be blunted in the effort to twist the innovation into familiar conceptual frames or established patterns of schools." Thus, team teaching looked like departmentalization; non-grading became a form of homogeneous grouping; new curricula were conveyed with traditional methods. (p.94)

Hall, Loucks, Rutherford, and Newlove, (1975) in their study at the Research and Development Center for Teacher Education at the University of Texas at Austin, reveal at least eight discrete levels of use that an individual may demonstrate in relation to any program. These levels range from nonuse to a very sophisticated use level. The more complex the program, the longer it takes for teachers to reach the higher levels of use.

In spite of the importance of the instructor in

determining the destiny of innovations, surprisingly little research has focused on the reasons instructors accept or reject innovations. This is especially true when acceptance or rejection on the part of instructors is related to the characteristics of the innovation itself. Logic dictates that success and failure of innovations in educational institutions mainly depend on these characteristics. If an innovation is not perceived to be suitable in accomplishing an objective, the best implementation plans will not make it a success.

Differences among innovations are important variables in explaining the diffusion process, so this study will be based on the premise that the attributes of an innovation itself are basic factors in explaining differences in the rate at which various educational innovations are adopted and accepted by instructors.

Rogers and Shoemaker (1971) have reported many studies on the attributes of innovations; many of their references come from rural sociology. Their conclusions may or may not pertain to educational problems. Therefore, a study of attributes of innovations, which are drawn exclusively from the field of education, will serve two purposes: (1) to replicate studies reported in other social sciences, and (2) to test reported conclusions in a new context.

In fact, the desired outcome of the study can be stated in terms of the following:

1. Contribution to the developing theory of diffusion in education
2. Development of an instrument in the form of a questionnaire to verify a set of perceived attributes of innovations identified by Rogers
3. Provision of a practical framework by which the unique characteristics of an innovation may be described and analyzed in relation to its acceptance
4. Measurement of the degree to which these attributes are perceived in relation to predictions of the acceptance of the innovation
5. Provision of a practical framework to be used by change agents as a base for planning strategies for adoption, acceptance and diffusion of an innovation in education

With these intentions the following research hypotheses were formulated.

Research Hypotheses

- H₁ - College instructors' perceptions of the degree of the relative advantage of innovations will be positively related to their acceptance of innovations.
- H₂ - College instructors' perceptions of the degree of the compatibility of innovations will be positively related to their acceptance of innovations.
- H₃ - College instructors' perceptions of the degree of the complexity of innovations will be negatively related to their acceptance of innovations.

H₄ - College instructors' perceptions of the degree of the trialability of innovations will be positively related to their acceptance of innovations.

H₅ - College instructors' perceptions of the degree of the observability of innovations will be positively related to their acceptance of innovations.

In supplementary analyses of this study two more hypotheses will be tested. These are:

H₆ - College instructors' perceptions of the degree of the specific attributes of innovations are related to continuation (discontinuation) of innovations.

H₇ - College instructors' perceptions of the degree of the specific attributes of innovations will differ with respect to high/low level of acceptance of innovations.

Setting of the Study

The rationale for selecting Michigan State University for this study is that early in 1960 MSU established one of the first and most extensive educational development programs among the largest institutions of higher education in the United States. Jerry Gaff (1975) in his book considers the MSU program among the top three in the United States.

Bratton (1978), investigating instructional improvement centers (IIC's) in higher education, studied forty centers and wrote:

The IIC's apparently keep few records which document who their clients are and what activities the staffs engage in. This lack of documentation was clearly

visible in the study. In addition, little evidence was offered to assess the impact and overall effectiveness of the centers within the institutions. It is important that criteria for evaluating each center's relative effectiveness and concomitant data-gathering procedures be developed. (p.150)

Fortunately, the Educational Development Program (EDP) project at Michigan State University has a complete list of the projects carried out from 1964 to present time, which provides necessary data for this study.

Basic Definitions

Rogers and Shoemaker define the characteristics of innovation as follows:

Relative advantage: The degree to which an innovation is perceived to be superior to ideas it supercedes. "Relative advantage, in one sense, indicates the intensity of the reward or punishment resulting from adoption of an innovation." (Rogers and Shoemaker, 1971, p.139). The authors consider some subdimensions of relative advantage, namely: (1) the degree of economic profitability; (2) low initial cost; (3) lower perceived risk; (3) a decrease in discomfort; (4) a saving in time and effort; and (5) the immediacy of the reward.

Compatibility: The degree to which an innovation is perceived as consistent with the existing values, past experiences and needs of the receivers. "Compatibility ensures greater security and less risk to the receiver and makes the

new idea more meaningful to him. An innovation may be compatible with (1) sociocultural values and beliefs; (2) previously introduced ideas; or (3) client needs for innovations." (Rogers and Shoemaker, 1971, p.145)

Complexity: The degree to which an innovation is perceived as relatively difficult to understand and use. "Any new idea may be classified on the complexity-simplicity continuum. Some innovations are clear in their meaning to potential adoptors, others are not....research evidence is far from conclusive in this case." (Rogers and Shoemaker, 1971, p.154)

Trialability: The degree to which an innovation may be tried on a limited basis. "New ideas that can be tried on the installment plan will generally be adopted more rapidly than innovations that are not divisible. An innovation that is trialable is less risky for the adopter." (Rogers and Shoemaker, 1971, p.155)

Observability: The degree to which the results of an innovation are visible to others. "The results of some ideas are easily observed and communicated to others, whereas some innovations are difficult to describe to others." (Rogers and Shoemaker, 1971, pp.155-156)

Innovation: An idea, practice, or object perceived as new by an individual (Rogers and Shoemaker, 1971, p.19). Havelock (1973) defines innovation as any change which represents something new to the people being changed. "For example, a kindergarten is an 'innovation' to a school

system which has not had one heretofore." (p.4) In the words of Rogers and Shoemaker (1971):

It matters little, so far as human behavior is concerned, whether or not an idea is "objectively" new, as measured by the lapse of time, since its first use or discovery. It is the perceived or subjective newness of the idea for the individual that determines his reaction to it. If the idea seems new to the individual, it is an innovation. (p.19)

Acceptance: Reported willingness to utilize an innovation in practice.

Limitations

1. In this study data are limited to perceptions gathered from a small population of university faculty, only generalizable to very similar settings.

2. The study is limited to the measurement of perceptions of faculty as the adopting units whose acceptance of the innovation is a focus for this study.

3. This study attempts to substantiate the paradigm of Rogers' five attributes of an innovation and their correlation to the acceptance of the innovation by the adopters. These attributes, though logically developed, are not inclusive. Other characteristics may have significance as well. However, this study will focus on measuring the five previously identified attributes.

4. Research completed to date on perceptions of innovations and their rate of adoption indicates some serious weakness, according to Rogers. The very nature of perceptions

as fluid, changing impressions, makes the problem of measurement elusive. In order to develop a methodological approach that would modify this problem, Rogers has suggested that perceptions be gathered at a time close to innovation-decision time, prior to adoption. In this study data are collected after decisions about adoption of innovations.

Assumptions

1. A study of the attributes of the innovation based on the perceptions of university faculty necessarily involves some basic assumptions concerning the nature of faculty as adopters. Guba (1968) identifies several assumptions "which the diffuser can make about the nature of the adopter whom he seeks to cause to consider an innovation; The adopter may be viewed (a) as a rational entity who can be convinced on the basis of hard data and logical argument of the utility of the proposed innovation; (b) as an untrained entity who can be taught to perform in relation to the innovation; (c) as a psychological entity who can be persuaded; (d) as an economic entity who can be compensated or deprived; (e) as a political entity who can be influenced; (f) as a member of the bureaucratic system who can be compelled; or (g) as a member of a profession who can be professionally obligated." ⁱ

Regarding the nature of the faculty as adopter, this study assumes for purposes of this research report that the respondents are rational and therefore can be convinced of the utility of innovations, such as EDP projects, and that they

can be persuaded and influenced as well. It is further assumed that the adoption-decision process is a consequence of choice and not compulsion from the educational hierarchy.

2. A questionnaire as a measuring instrument of perception can yield reliable data when properly designed, applied and analyzed.

3. The reported and expressed perceptions of the users of an innovation can be significantly related to the verification of the attributes of that innovation.

4. Perceptions of users of innovations provide valid means to describe the acceptance process.

5. It is assumed that the respondents will maintain frankness in answering the questionnaire.

This total set of limitations and assumptions must be related to the acceptance and implementation of the research findings of this report.

Summary

In this chapter, the purpose of this study is defined, the significance clarified, and definition of key elements given. Hypotheses, limitations and assumptions underlying this study are also stated.

Chapter II will present a review of the literature of diffusion of innovation.

CHAPTER II

REVIEW OF THE LITERATURE

This research report is planned as a contribution to the developing theory of diffusion through an empirical investigation (in the form of a survey research) of perceived characteristics of an innovation within the Educational Development Program at Michigan State University.

This chapter provides a selective review of the literature relevant to the developing foundation for this study. The literature reviewed is chosen to illuminate the research problem and includes references to research and non-research literature in the area of diffusion theory, organizational change, funding of change projects and effects of the type and size of change projects.

Diffusion Theory-- A Review of the Literature Related to Diffusion of Innovations

During the past decades research and resource development in education has created a general expectation for improvement at all levels of schooling. Attention has focused on changing ideas about educational process and practice. And the use of educational technology increases. Yet the best of research and the most impressive alternatives to educational practice continue to have minimal impact on the

classrooms. Whatever change strategies have been designed may not have adequately considered the diffusion process.

Mort (1964) provides us with a rather comprehensive analysis of two hundred and fifty studies (to 1961) relating to patterns of diffusion, factors of innovation and conditions affecting the adaptability of school systems. Some of these pertain to problems with which this study is concerned. For example, Mort noted that: (1) typically, an extravagantly long time elapses before an insight into a need (or a discovery that past practice is indefensible) is responded to by innovations; (2) the rate of diffusion of innovations appear to be slow for both simple and complex innovations. And accordingly, innovations that increase cost move more slowly than those that do not; (3) as a suggestion to innovators, Mort says that "knowledge of the slowness of spread of an innovation--among the teachers in a school, among the schools in a school system, and from school system to school system--is essential. Lack of such knowledge has resulted in the abandonment of many good investigations before they had a chance to put down their roots." (p.327)

There are a series of major reviews of the diffusion research literature that followed the Mort study. In 1962, Rogers reviewed a broad range of studies that were concerned, principally, with innovation in agriculture and medicine. Another major study is by Katz, et al., (1963)

In general, these early studies focused on the receivers' perception of new knowledge and the stages through which

these individuals proceed in order to reach the decision to adopt that innovation.

Havelock (1969) has written a comprehensive comparative review of the research literature on the dissemination and utilization of scientific knowledge. In the diffusion-adoption section, Havelock clusters diffusion studies into a "social interaction" school. Rogers and Katz exemplify this approach. Havelock provides us with the following overview:

This school includes models in which the unit of analysis is the individual receiver, and in which the focus is on the receiver's perception of and response to knowledge coming from outside himself. This knowledge is usually in the form of an identifiable product or practice which has been made available to a potential adopting population. Authors who consider the process of adoption from this point of view are concerned with the stages through which individuals pass as they reach a decision to adopt an innovation. They are concerned in addition with the related issue of the mechanisms by which the innovation diffuses through the adopting group. Studies in this area have shown that the most effective means of spreading information about an innovation is through personal contact. Thus, the key to adoption is viewed by authors of this school to be the "social interaction" among members of the adopting group. (p.10)

Rogers' (1962) model for this adoption process was most generally used, and according to Havelock, most widely accepted in studying diffusion adoption through the social interaction process. The model includes five stages through which the adopter moved toward adoption. These five stages were identified as Awareness, Interest, Evaluation, Trial and

Adoption. Katz, et al., introduced a somewhat different focus in the conceptualization of the process. The Katz study (1963) defines the diffusion process as: "(1) acceptance; (2) overtime; (3) of some specific item--an idea or practice; (4) by individuals, groups, or other adopting units linked; (5) to specific channels of communication; (6) to a social structure and; (7) to a given system of values or culture." (p.237)

Acceptance or adoption is stressed in both definitions and can be thought of as the basic intent of diffusion activities.

Gross, et al., (1968) challenged the utility of the Rogers model. According to these authors, the model implies assumptions which are not applicable in explaining the implementation of major organization innovation. They refer to reports that distort the independence of the teachers as receivers. Gross, et al., in their study, provide us with the following view:

Some reports about innovations in schools, which specify changes in the behavior of teachers, do mention or discuss teacher variables such as their attitudes, their acceptance of the innovation, and their capabilities. However, most ignore the perspectives of teachers and typically present only the administrators; or outside change agents' perceptions of the attitudes of performance of the faculty. (p.39).

The Gross study isolates four variables which the authors conclude are necessary components of the conceptual scheme for analysis of implementation of innovations.

These authors contend that their study identifies elements that should be included in the developing theory of the implementation of directed change. Their report states, "we would contend that formulations applied to the problem of the implementation of directed change that do not take into account the clarity of an innovation, members' capability to perform it, the existence of tools and resources, and the compatibility of organizational conditions with the innovation, may influence the degree to which an innovation if implemented, and are based on an overly simplistic conception of the implementation process. These variables need to be introduced into the scheme of analysis not only because they are essential to account for the case of a failure of the implementation of an innovation we studied; more generally, it can be argued that on an a priori basis they appear to be a set of variables that constitute desiderata for the maximum implementation of most organizational innovations." (p.15)

In attempting to identify reasons for the conditions of failure, the report places the major burden of responsibility on the failure of the administration "to recognize or cope effectively with the problems to which it exposed teachers" when the staff was asked to carry out this innovation. (p.17)

After surveying the literature of diffusion theory, these authors conclude that there is a deficiency of investigations concerned with "testing relevant theories or generating testable hypotheses about factors influencing degree

of implementation. Second, data used to isolate conditions having an impact on implementation are not obtained from the perspective of those who must make the behavioral changes specified by the organizational innovations in addition to those who initiate them. Third, careful measurement is not made of the degree of actual implementation; this would require collecting and analyzing data based on systematic observations and not using data about "effects" as indices of successful implementation." (p.39)

Others who have considered the experiences of teachers in piloting innovation included Miel, (1970) who makes the following statement: "In education it is the teacher who must take on new insight, attitudes, skills, and habits and make an innovation work. No matter where the idea for a curricular innovation originates, the key figures in the drama are those people at the end of the chain who determine the success or failure of the innovation by the way they meet chance." (p.158-9) However, in many instances changes in schools are essentially organizational and structural and basically unrelated to the teacher as a person. Network change strategies have yet to be designed that facilitate the transfer and spread of innovation more directly to the teacher.

Faced with an accelerating pressure to learn new educational procedures and respond to demands of change, teachers have become frustrated and overwhelmed. In field studies of teachers engaged in change, Lippitt (1967) has found they

are generally unprepared, though they spend a lot of energy on their jobs and are frustrated by their images of unachieved potential.

In Lippitt's research on the innovation--diffusion process, information regarding facilitators of these processes is discussed. Significant to this study is the importance given to "structure and arrangements of the school building" as "relevant in determining which teachers will have information with, and adopt from teachers. [sic] " (p.318) Indications are that the physical arrangement of the school appears to influence the innovation-diffusion process, and, in fact, show up as "very important" in the Lippitt research. Other factors as important characteristics include teacher's perceptions of their own position of influence in the peer social structure, the availability of resources and facilitation of openness and communication. Indeed, teachers expressed needs for "skills in communication with one another in order to facilitate professional sharing." (p.317)

In examining sources or supports for the teacher, Lippitt draws attention to the limitation of commonly prescribed panaceas as they are related to the spread of new ideas and techniques in the classroom. Common present procedure of the teacher seeking support and resource would be to turn to the administrator or supervisor, who is hopefully in innovative or adaptive efforts.

Goodlad and Klein, (1970) have completed a study that measures 150 K-4 classrooms against ten reasonable

expectations. These researchers sought to find defined educational objectives, varied instructional materials, diverse teaching strategies, group discussion techniques, flexible standards for evaluation of students. What they did find hardly coincided with these expectations. The fare was routine, dull and lacking in variety. Teachers and children continued along in isolated, self-contained classrooms and, although principals and teachers did express interest in changing testing procedures, for example, they reported that they didn't know how to go about doing so. Goodlad reminds us in his study that both principals and teachers simply did not know how to go about implementing change.

Sarason (1971), writing about goals of change in the classroom, observes:

The more I have read about and personally observed efforts to introduce change in the classroom the more clear several things become. First, those who attempt to introduce change rarely, if ever, begin the process by being clear as to where the teachers are, that is, how and why they think as they do. In short, they are guilty of the very criticism they make of teachers: not being sensitive to what and how and why children think as they do. As a result, teachers react in much the same way that many children do and that is with the feeling they are both wrong and stupid. Second, those who attempt to introduce a change seem unaware that they are asking teachers to unlearn and learn. Third, if there is any one principle common to efforts at change, it is that one effects change by telling people what is the right way to act and think. Here too, those who want change do exactly that for which they criticize teachers. (p.193)

This study attempts to deal with an aspect of Sarason's "goal of change in the classroom" in terms of the context or focus on gathering perceptions from teachers--"where the teachers are, that is, how and why they think as they do."

In order to facilitate the adoption event, Guba, (1968) suggests that a person with prime commitment to diffusion is needed. Guba refers to this role as a "diffusion agent or diffuser," one who engages in providing alternatives to practitioners faced with problems of planning for change. (p.295) Innovation, in this instance, offers one alternative to problem resolution. Needed diffusion strategies the diffuser might employ are identified by Guba in a set of five factors: diffusion techniques, assumptions concerning the end state in which one wishes to leave the adopter, assumptions about the nature of the agency or mechanism carrying out the diffusion activity and assumptions concerning the substance of the innovation. This last factor is particularly relevant to the present study. According to Guba, "not all inventions are alike; they pose different problems of adoption, and this fact must be taken into account in developing an appropriate diffusion strategy. One way to view this problem is in terms of the amount of change mandated by the innovation." (p.295) He identifies for us what may be thought of as a summative characteristic of an innovation.

Harris and Matula, (1972) conducted a study to explore the relationships of specific variables to the classroom teacher's expressed willingness to use selected new

educational programs. They found "differences in characteristics of new programs were reflected in the willingness of teachers to use each of the programs." (p.3) The authors indicate that teachers were less willing to use programs "considered more involved and demanding." They also suggest that their data "may reflect differences in general attitude toward innovation, differences in the nature of perceived needs of students or differences in the perceived compatibility of the program with the current program." (p.6) According to this study, "interest, peer support and the characteristics of the innovations are important to teachers in adoption of new programs." (p.7) They also add that "factors such as age, experience and amount of education are not significant." (p.9)

The striking characteristic in most of these studies of diffusion theory is the focus on the activities of both the sender and the receiver, and not the innovation itself. Evidence is gathering, however, that diffusion theory has been redirected from the exclusive view of resistance-adopter, sender-receiver categories to a more encompassing situation basis. And this more recent approach includes a careful examination of the innovation and the role of the change agent in the communication of new ideas.

Organizational Change

Much of the general adoption literature has its roots in studies of the spread of agricultural practices by rural

sociologists and most of these studies have focused primarily on the individual as the adopting unit. These studies of adoption provide insight into individual considerations and behavior relative to innovation adoption but the findings are not directly applicable to educational systems because of the complex organizational structure of schools. As Gross, Giacquinta, and Bernstein (1971) have argued:

After this extensive review of adoption and diffusion studies, Rogers proposes a model to explain why individuals do or do not adopt innovations...We believe, however, that this model has little use in explaining the success or failure of the implementation of innovations in schools or other types of organizations. Its lack of utility is due to certain of its assumptions which are not applicable to the implementation of organizational innovations. (pp.20-21)

Gaynor (1977) sees the emphasis upon the individual as the adopting unit as a major weakness in the change literature. As he suggests, "persons operating as members of organizations are simply not as free as independent entrepreneurs (e.g., farmers and physicians) to implement significant innovations entirely on their own initiative. They are freer to propose innovations than they are to implement them..." (p.12).

In educational organizations various approaches to the study of innovation have been established. Willower (1970) names three such approaches. The first stresses the content of the curriculum and the preparation of material to correspond with the program objectives of particular fields of study. A second approach, referred to as a "process"

approach, considers innovations in terms of the interests and needs of the students, presupposing that learning is increased when students have positive attitudes and high motivational levels. A third approach to the literature on innovation in education is that of "adoption-diffusion".

Willower describes this approach as having:

emphasis...on...adoption and diffusion, including such factors as the characteristics of early and late adopting units, the rate of diffusion and distinguishing features of innovations that accompany variations in this rate...(the adoption-diffusion approach)...has its historical roots in rural sociology and the study of new farming practices. (pp.388-389)

Eichholz and Rogers (1964), using the "adoption-diffusion" approach to innovation, describe diffusion as the complete process by which an innovation is communicated, disseminated, and finally adopted throughout a user system.

The adoption and diffusion of innovations has typically been a difficult and complex process. The length of time involved from the initial awareness of a need to the final diffusion of an innovation throughout a user system varies from institution to institution. Certain agricultural innovations reported an average time lag of 1.54 years between the time of awareness and adoption (Beal, Rogers and Bohlen, 1957). Studies of other technological innovations suggest that five to ten years is a typical time lag (Voegel, 1971). As Mort (1964) states in reference to educational innovations:

The early studies indicated that change... comes about through a surprisingly slow process and follows a predictable pattern.

Between insight into a need...and the introduction of a way of meeting the need...there is typically a lapse of a half-century. Another half-century is required for the diffusion of the adaptation. During the half-century of diffusion, the practice is not recognized until it has appeared in 3% of the systems of the country. By that time, fifteen years of diffusion--or independent innovation--have elapsed. Thereafter, there is a rapid twenty years of diffusion, accompanied by much fanfare, and then a long period of slow diffusion through the last small percentage of school systems. (p.318)

This tremendous time lag, together with reports from the U.S. Department of Commerce that up to 90% of all innovations fail within four years after being introduced (Rogers and Shoemaker, 1971), indicates the size of the problem faced in implementing innovations in educational systems. In order for educational systems to keep pace with our rapidly changing society, more expedient methods of integrating innovations into organizations are being developed. One such method involves the use of a versatilely trained social science professional in the role of a change agent. Such research-based agents are proving to be a crucial link between information centers and the classroom (Cooke and Zaltman, 1972). Voegel (1971) says "the change agent fills this role as a learning system expert in cooperating with the faculty to design, implement and evaluate new instructional strategies and approaches." (p.69) The change agent must be able to translate a conceptual model into a learning or instructional model, which he then introduces and helps

to integrate into an organization. This requires not only an understanding of the innovation, but knowledge of the facilities, location aid, information resources, staff, and materials of the institution (Voegel, 1971).

The job of the change agent then, is nothing less than "that of harnessing the bureaucracy, of creating structures designed to nurture a genuine concord of values, goals, and action"(Willower, 1970, p.390). In other words, he guides the adoption-diffusion process.

The change agent's work has been hampered, in part, by incomplete information in the literature concerning organizational variables in relation to the adoption of an innovation. Willower (1970), in his discussion of the adoption-diffusion literature, specially points to the basis of this problem:

The adoption-diffusion model has been rather fruitful, but it derives from a tradition that addresses adoption by individuals rather than by organizations. Hence, a typical and a key concern has been characteristics of persons who vary in adoption rates. (p.389)

Rogers and Shoemaker (1971) also point out the need to consider variables other than characteristics of persons involved in the adoption process. They suggest that an investigation of how the properties of an innovation and its presentation affect its rate of adoption could assist the change agent in predicting the success of various presentations in particular institutional settings. While their emphasis is clearly on the properties of an innovation and

their perception by the institution, the need for a predictive measure of some sort is also stressed. However, even with a means of rating particular properties of innovations, there still remains the problem of rating institutional adaptability. Hilfiker (1970) directly addresses himself to this problem. He argues that:

Little attention has been given to the social or psychological characteristics of the receiving system (such as a school or school system) and how these characteristics might affect the rate of a given innovation or change...If it becomes possible to consistently diagnose and evaluate the "state" of a school system's organizational climate, it might be feasible to modify the adaptability of professional personnel and to change or create organizational structures and processes which tend to enhance the possibilities of successful institutionalization of innovations. (p.27)

It is also possible that certain ideological beliefs in the educational profession serve to block educational innovation and the study of educational innovation by effectively insulating educational practitioners from reality. For example, belief that schools are locally controlled, that the school teacher is an independent, autonomous professional, and that teaching and learning cannot be effectively measured or specified in other than intuitive terms, all appear to serve the function of protective myths. As Miles (1964) pointed out:

...The teacher's ideological commitment to professional autonomy appears to be belied by heavy classroom reliance on texts and materials, confused role expectations for the teacher may be at work;

for example, reading experts do not accord full professional status to teachers, yet expect them to act autonomously and rely less on texts. Thus it seems likely that local innovative efforts are restricted by the fact that the teacher's role is actually that of a bureaucratic functionary who has little power to initiate systemwide change, but--because of the ideology concerning professionalism alluded to above--tends to resist innovative demands, like most professionals in bureaucratic organizations.

Other aspects like vulnerability to outside influence, the use of persons rather than physical technology as primary instruments of change, lay control, and the communication behaviors found in the individual organizations, may serve to lower innovation rates in educational organizations, when seen comparatively with other types of organizations.

Modern studies on planned change began in the 1940s with attempts to understand the diffusion process of technical innovations. The purpose of these was to examine how Agricultural Extension Agents were able to convince farmers to adopt such innovations as hybrid corn. A little later, this literature was expanded to examining how doctors adopted new medical techniques or drugs. Those studying the diffusion process characterized the central problem of innovation as adoption. Innovations were seen as basically "self-winding" after adoption. In fact, much of the change literature through the late 1960s has been focused on examining similar situations (Parker, 1980).

Because of this early emphasis, a large body of

literature developed around the phenomena of initial resistance to change. It was felt that the advantages of the innovation would be obvious to the individual adopters if they would only become aware of it and try it. Writers examined various tactics that extension agents or medical supply companies could use in overcoming initial resistance, Parker (1980) writes:

Tactics that were studied included peer pressure, leader-follower phenomena, comparative information, appealing to the individual's self esteem, and similar marketing strategies. Findings from these studies seemed to improve adoption which reinforced the belief that initial resistance was a primary barrier to change. This encouraged others to continue to examine this phenomena. Examples of these writings include Argyle (1967), Bennis (1966), Coch and French (1948), Lawrence (1954), and Zander (1961).
(p.431)

Another outgrowth of the early literature on dissemination efforts of the agricultural change agent was looking at the outside consultant as a catalyst for change. It was felt that often potential adopters had neither the exposure to potential alternative innovations nor the technical expertise to evaluate them. The consultant, on the other hand, because of training and exposure, had a wealth of knowledge and expertise and could provide these resources, as needed, in a cost-effective manner. Rogers (1975), in his bibliography on the diffusion of innovation, provides us with a long list of studies examining the consultant as a change agent, including Brown (1966), Fantini and Weinstein (1963),

Greiner (1967), and Lippitt et al. (1966). Parker (1980), in his review of planned organizational change, says the change literature has recently received harsh criticism for this focus. He mentions four shortcomings of this literature:

1. The studies assume adoption means implementation and continuation of the innovation. They focus primarily on problems of overcoming the initial resistance to change. Both Gross et al. (1971) and Berman and McLaughlin (1978) indicate that adoption does not guarantee implementation and implementation does not guarantee institutionalization.
2. The studies focus primarily on technical innovations which are relatively easy to measure and evaluate (i.e., hybrid corn). Rogers and Shoemaker (1971) found that modern social innovations were not as easily evaluated and measured. Analysis is complicated by the following:
 - a. Relative advantage;
 - b. Compatibility;
 - c. Complexity;
 - d. Trialability;
 - e. Observability.
3. The studies assume individual adopters, as opposed to complex organizations. Gaynor (1977) points out that today it is organizations, not individuals, that adopt innovations.
4. Many studies assume the involvement of an outside change agent. Goodridge (1975) found that teachers were more effective change agents than consultants or outside facilitators. Berman and McLaughlin (1978) went beyond this to point out that consultants were largely ineffective in facilitating change. (pp.342-33)

There have been several attempts to synthesize these studies into models of change. Havelock et al., (1971) and Paul (1977) will provide a more in-depth review of these models. Briefly, the four models which have received

significant attention in the literature are describe in the following sections.

Problem solving

This model grows out of the work of the National Training Labs (NTL) and their emphasis on sensitivity training and T-groups. Historically their work has involved removing individuals or groups to a neutral setting and involving them in intense periods of training. The focus now appears to be an emphasis on working within organizations to improve organizational problem solving.

The process involves building the user's capacity to solve problems or address needs which the user has identified. This model casts innovation in a "diagnostic" frame, and emphasizes the search and selection process. This is done through the help of an outside facilitator or trainer.

Social interaction

This model grows out of studies primarily of the Agricultural Extension Agency as mentioned earlier. It focuses on the diffusion of innovations and looks at communication channels, influence patterns and outside stimuli. It largely involves simple innovations and individual adopters and assumes information is the major motivation to adopt.

Research-development-diffusion

This model evolves primarily out of the federally funded Research and Development Centers. The process is: basic research to applied research to testing to dissemination to installation. This approach assumes the user is a rational but relatively passive receiver.

Linkage

This model was developed and recently received attention primarily through the work of Havelock (1969 and 1972). It involves establishing communication networks between sources of innovations and users through a linkage agent or institution. The process, according to Havelock, includes the following broad steps:

1. Needs identification;
2. Transformation into problem statements;
3. Developing user capability at problem solving;
4. User centered solution building;
5. Problem solution summaries in user language and disseminated through user communication channels;
6. Establishment of on-going user resource linkage.

These models do not resolve the major shortcomings mentioned earlier. They continue to assume the problem of effecting change is one of bringing about adoption. As organizations become more complex and attempted changes become more intricate, much of this literature becomes obsolete. The authors of the 1970s then began examining the problems of implementing elaborate changes into complex social systems.

Many authors looking at complex social system change focused on aspects of the organization's ability to assimilate the innovation. Basically they examined factors related to the compatibility and feasibility of an innovation given the political, economic and organizational realities, constraints and capabilities. The following provides examples of these factors and authors emphasizing their importance, as given by Parker (1980) in his review of planned change:

1. Environmental influences outside the organization: (Baldrige and Deal, 1975; Gaynor and DuVall, 1977; Paul, 1977)
 - a. Stability of the environment;
 - b. Community wealth;
 - c. Sophistication of influence, groups and individuals;
 - d. Power of influence, groups and individuals.
2. History of the organization and pre-existing capabilities: (Baldrige and Deal, 1975; Bennis et al., 1976; Greiner, 1967; Giacquinta, 1973; Gross et al., 1971; Havelock et al., 1969; Paul, 1977; Sarason, 1971)
 - a. Clarity of organizational goals and mission;
 - b. Degree of consensus on organizational goals and mission;
 - c. Effectiveness of external linkage networks with other organizations and agencies;
 - d. Organizational wealth;
 - e. Appropriateness of governance and decision making process;
 - f. Effectiveness of organizational problem solving processes;
 - g. Length and success of management and staff;
 - h. Management's willingness to modify organizational procedures;
 - i. Flexibility of management and staff;
 - j. Management and staff's tolerance for conflict and change;
 - k. Appropriateness of management's guiding values for selecting and retaining personnel;
 - l. Level of management and staff's strength and confidence;
 - m. Level of management and staff's trust;
 - n. Level of staff participation;
 - o. Staff value homogeneity;

- p. Existence of an effective evaluative feedback process.
3. Characteristics of the innovation: (Baldrige and Deal, 1975; Giacquinta, 1973; Paul, 1977; Rogers and Thomas, 1975)
 - a. Compatibility with environmental factors;
 - b. Compatibility with organizational factors;
 - c. Relative advantage of this innovation in solving the identified problem;
 - d. Clarity of needs assessment and problem statement;
 - e. Effect on existing power structure, authority and responsibility;
 - f. Degree of complexity;
 - g. Trialability and divisibility for possible staging;
 - h. Funding amount, source, and duration;
 - i. Source of initial impetus for change (internal/external and/or top management/grass roots);
 - j. Degree of internal consistency of the change.
 4. Characteristics of this institution regarding this innovation: (Baldrige and Deal, 1975; Bennis et al., 1976; Gaynor and DuVall, 1977; Giacquinta, 1973; Havelock et al., 1969)
 - a. Appropriateness of commitment of human and financial resources;
 - b. Degree of management and staff support;
 - c. Who decided to implement?(power equalization);
 - d. Who must implement?(division of labor);
 - e. Degree to which the problem has created conflict or a crisis;
 - f. Relationship of innovation to staff values;
 - g. Awareness of alternative potential innovations;
 - h. Locus of effective control for this innovation. (i.e., does the organization control the key elements needed to effect this change?) (pp.434-35)

Some other authors of the 1970s have focused on the importance of planning and the planning process in effecting change. They stress the needs to clearly identify needs, objectives, outcomes, and the resources required to support the change (Bennis et al., 1976). Within the planning process, the implementation step received special attention.

Implementation was seen by Paul (1977) to include activities such as the following:

1. To identify who is responsible for each action step, develop work contracts, and set staff evaluation dates.
2. To identify staff development needs and create a plan for providing training.
3. To set realistic target dates for completion of each action step.
4. To develop a system for process evaluation.
5. To develop a process for identifying and resolving problems, conflicts and obstacles.
6. To develop an appropriate information feedback process (i.e., a product evaluation and system self-corrective process).

In general, change is a noticeable alteration which takes place in the goals, structure, or processes of a system over time. The observer of formal organizations is forced to the conclusion that most organizations are not characterized by rapid change.

Indeed, when organizations are observed over a long period of time, they appear to be characterized by stability, rather than change. Since (1) a formal organization is a structural mechanism employed by society to achieve one or more of its commonly-accepted goals, (2) the goals do not change noticeably, and (3) each organization's activities are rather clearly demarcated, then any particular organization comes into existence with a great deal of built-in

stability. This stability is so great as to constitute a powerful resistance to change.

On the other hand, it is clear that organizations do change. In many organizations the increments of change are small, but in others, change is so radical as to cause the disappearance of the original organization and the appearance of a new one. As an organization changes, the members of that organization also must change, must acquire an unaccustomed facility for change, if they are to live in a modern world.

Educational institutions have joined the ranks with changing organizations in the past decade. The reason for this move is given by Abedor and Sache (1978):

...First, the emergence of educational technology as a field of specialization provided both personnel and tools to address the complex problems involved in improving learning and teaching. Second, many institutions, as a result of changing enrollment patterns, new clientele, shrinking resources, and burgeoning knowledge in the disciplines, realized that improvement of teaching was not a simple task. On the contrary, it remains an arduous task requiring a long-term institutional commitment of personnel and dollars (Davis, et al., 1976; Gaff, 1975). Third, because of the general decline in the economy and resultant tightening of the academic job market, faculty are becoming far less mobile. With less turnover of faculty to stimulate new ideas and processes, the stimulation and renewal must come from within the institutions (Group for Human Development in Education, 1974). Fourth, enrollment in higher education has entered a period of continuous decline. Institutions must thus compete for a smaller number of students, or cultivate non-traditional populations. It is likely that improved instruction can provide a competitive advantage when recruiting potential students. (p.2)

In order to accomplish necessary changes, educational

organizations have established centers, agencies or programs whose purpose is to help organizations and faculty to improve their teachings. A study by Centra (1976) found more than 700 institutions have established such programs in the last few years. These centers are involved in different kinds of change efforts which is the topic of the following section of this review.

Type of Change Projects

Finding, modifying or developing an instructional innovation, is only part of the larger process of bringing about instructional change. It is necessary that innovations be tolerated by individuals and organizations who will use them. Abedor and Sachs (1978) believe "in sum, it might be said that both the individual faculty member and his organization must concur that a particular instructional innovation is a worthwhile enterprise, or the use of the innovation is likely to be short lived." (p.5)

Centers, programs or agencies in university settings are involved in three type of change efforts:

1. Organizational (development) change.
2. Faculty (development) skill change.
3. Instructional (development) change.

An increasing number of colleges and universities have established agencies on their campuses intended to provide support for faculty who desire to attempt academic innovation.

While the scope and structure of these agencies vary from

campus to campus, they share one common goal: to contribute to the development of improved college instruction. Schauer (1971) argued that necessary instructional innovation and improvement are not easy tasks:

It has become evident in the past few years that the improvement of instruction necessitates a concerted effort on the part of able teachers, administrators, resource people, and concerned citizens. (p.44)

Gaff (1975 a) explained that higher education will have to look inward to solve these problems, since the end of the era of surplus external money and high faculty mobility has limited the likelihood of change coming from infusions of external money or new faculty members:

Most colleges and universities are affirming the primacy of teaching rather than research. Faced with the prospects of leveling student enrollments, declining faculty positions, and becoming "tenured in," most institutions are coming to realize that they will have to rely on their current faculty to provide fresh perspectives, infuse new ideas, and give leadership to innovative programs if they expect to maintain vigorous educational climates in the years ahead. (p.91)

In order to assist their faculty members to meet these challenges, many institutions have turned to instructional development, fueling the growth of such programs. Buhl (1975) emphasized the relative recency of the instructional development movement, explaining that as a formal movement "with a set of people who see themselves working at a profession, instructional development is perhaps no more than 15 years of age. Only over the last five years has it gathered real force" (p.3). Gaff (1975a) also discussed the

recent growth of instructional improvement programs in higher education:

Centers, divisions, offices and programs have been established to provide services variously referred to as instructional development, learning resources, faculty development, teaching improvement, professional development, or organizational development. They have been established by every kind of college and university as well as by state systems, consortia, and associations. ...These new enterprises are still in the formative stage. Improving the quality of instruction has been like the weather--everybody talks about it but nobody does anything about it. But today, new concepts of instructional improvement are being advanced and new programs are providing opportunities for faculty members to enhance one or more aspects of their teaching. (p.91)

Durzo (1978) reviewing literature on the role of instructional development agencies wrote; "The literature describes many of the roles undertaken by various agencies; however, it does not offer any clear answer to questions about the optimum combination of roles which an instructional development agency should play." (p.118)

Roueché and Boggs (1970) listed seven functions which an educational development agent ought to perform in a community college setting:

1. To train faculty
2. To help select and state learning objectives
3. To help with measurement problems
4. To help design learning activities
5. To help redesign learning activities
6. To conduct instructional research and evaluation
7. To promote research-based decisions (pp.8-9)

A more comprehensive list is provided by Alexander and Yelon (1972) which is presented in Table 2.1.

Not all instructional improvement efforts approach the

Table 2.1

Typical Activities of Fourteen
Instructional Development Agencies

A. SERVICE

1. Conduct faculty workshops, seminars, institutes, and training programs on learning, instruction, and associated topics. (8)
2. Assist departments in analysis, planning, and design of curricula. (7)
3. Assist faculty to develop instructional materials. (7)
4. Internal publications: handbooks, project reports, and notes on instructional development topics. (7)
5. Consult with individual faculty members. (5)
6. Provide test scoring and analysis services. (5)
7. Provide instructional TV services. (5)
8. Administer and score standard tests (admission, placement, etc.). (5)
9. Provide media equipment (store, repair, and distribute). (4)
10. Maintain reference library on instructional development topics in higher education. (4)
11. Advise and assist community agencies outside university (schools, hospitals, UNESCO, and WHO). (4)
12. Maintain laboratories for faculty research and development in instruction. (3)
13. Provide administration with technical advisory services, re: instructional development. (3)

B. RESEARCH AND DEVELOPMENT

1. Learning system design: instructional models, materials and procedures. (14)
2. Instructional programs: underprivileged students, honor students, foreign language students, simulation and gaming, and professional curricula (medicine, law, and pharmacy). (14)
3. Instructional evaluation. (8)
4. Training programs for faculty and teaching assistants. (5)
5. Individualized instruction, independent learning, computer-aided instruction, and programmed instruction. (5)
6. Educational tests and measurement. (4)
7. Impact of college on student development; recruitment. (3)
8. Organizational planning and governance. (2)
9. Cost benefit analysis of instructional systems. (1)
10. Instructional applications of media. (1)

Table 2.1 (cont'd)

C. COURSES TAUGHT

1. Instructional design and technology. (8)
 2. Educational Psychology. (6)
 3. Statistics and research design. (3)
 4. AV Media. (3)
-

SOURCE: Alexander and Yelon (1972), pp.4-5

NOTE: Number in parantheses refer to the number of agencies reporting the activity.

problem in the same manner. In fact, different agencies often view the same symptoms as relating to different problems. Following a study of instructional improvement programs for the Exxon Education Foundation, Gaff (1975 a) observed:

Although all instructional improvement programs are designed to raise the quality of teaching and learning, these programs vary considerably. Depending on what aspects of the teaching-learning process they emphasize, they may be categorized in one of three ways: as instructional development, faculty development, or organizational development. Each category draws on different intellectual traditions, makes different analyses about what ails teaching and learning, and prescribes different solutions. (p.94)

His book, describing the results of the Exxon Study (1975), explained the difference among the three approaches. Instructional development (ID), he says, focuses on "courses or curricula, and...seeks to improve the conditions and materials that promote student learning" (p.10). He believes

that the intellectual roots for this approach lay in curriculum and instruction, learning theory, educational media and technology, and systems theory. This view is generally in agreement with the views of the majority of those writing about instructional development.

He described the faculty development (FD), approach as one which "focuses on faculty members and seeks to promote their individual growth and development." (p.8) He felt that such programs help faculty to explore their attitudes about teaching and learning and acquire more knowledge and skills related to the teaching-learning process. Gaff tells that "the intellectual underpinnings of faculty development are in clinical developmental and social psychology, psychiatry, and the sociology of work and socialization" (pp.8-9). The focus of this approach is on faculty members rather than the courses they teach.

Organizational development (OD), he said, focuses on the institution as a whole or on some sub-unit such as a department or a division and "seeks to create a more effective environment within which teaching and learning can occur" (p.10). This approach is based on organizational theory, organizational change, and group dynamics. The goal of organizational development is to develop administrative and interpersonal competencies among organization leaders and to develop policies that support teaching improvement.

Gaff (1975) presented a useful way of distinguishing among the types of instructional improvement efforts:

however, he did not attempt to evaluate the relative effectiveness of each approach in improving the teaching-learning process. He did, however, suggest that these approaches are complementary and should be combined in any comprehensive approach to the problem of instructional improvement.

Abedor and Sachs (1978) consider a spiral relationship between OD, FD, and ID:

In sum, it is the faculty member who must ultimately select an innovation to improve teaching and learning. If the innovation selected requires a level of individual and organizational readiness which exceeds the existing level, then clearly FD and OD activities are warranted. If the faculty member selects an innovation for which he or she is ready, but for which the organization is not ready, there are three possible outcomes. First, the innovation may fail due to lack of departmental acceptance. Second, the innovation may be modified to conform with the department's existing level of readiness. Third, OD activities may be conducted concurrently with ID activities to ensure acceptance of the innovation. On the other hand, a faculty member may select an innovation for which the existing level of organizational readiness is sufficient for immediate acceptance. In the latter case, the success of the innovation itself may stimulate additional readiness which will facilitate further innovation. (pp.16-17)

Some studies tend to suggest that changes to be incurred through instructional development are more successful than changes requiring organizational or faculty changes.

Orlich's (1979) review of innovations in education provide us with the following generalization: "curriculum and instructionally related innovations are easier to implement than those requiring changes in organization or administration".

(p.6) He mentions that the review of research conducted by

Fullan and Pomfret (1977) and Charters, et al., (1973) tend to support this generalization. Orlosky and Smith (1972), reviewing major change efforts of the past seventy-five years in schools, conclude:

Curriculum changes involving the addition of subjects or the updating of content are more permanent than changes in the organization and structure of curriculum.... Efforts to alter the total administrative structure, or any considerable part of it, are likely to be unsuccessful. (p.414)

In order to bring about change, educational institutions need variety of resources, among which is availability of necessary funds to cover the expenses of the change effort. The following section of this review will look into effects of funding on changes.

Funding Effects On Change

The schools lack money to experiment with innovations. By providing "seed money", external sources would allow schools to try out new practices and to continue them if they prove to be successful. This notion corresponds with Charter and Pellegrine's (1973) idea of "the apparent assumption that schools need little additional resources (financial and personnel) to cope with the massive organizational disruptions during the period of transition from one educational program form to a new one". (p.12) Havelock and Huberman (1978), studying educational problems in developing countries, state that "beyond our findings with regard to these teacher training projects, there is considerable evidence from other

sources that outside financial assistance is a vital factor in many types of educational innovations." (p.171) Alexander and Yelon (1972) summarized the sources of funds which supported 14 of the instructional development agencies represented at the 1971 Michigan State Conference. (See Table 2.2)

Table 2.2
Instructional Development Agencies'
Sources of Funds

Source	Number
University General Fund	5
Grant	3
Combination of General Fund and Grant	3
State Budget Line Item	2
No Data	1
Source: Alexander and Yelon (1972), p.6	

Engel (1969, p.70) reported that the sources of funds for the 72 instructional development agencies that he surveyed were from varied sources including:

- A special fund from the central administration
- A grant or contract from an outside source
- Instructional development program/department or audiovisual center funds
- Funds appropriated to individual departments for development work
- Interinstitutional consortium (a small amount for one institution)
- Self-perpetuating revolving fund (indicating a system of charges for service and sales of products)

He observed that the heaviest concentration of funds supporting instructional development programs came from the instructional development department or audio-visual center in which the program was housed. Twenty programs reported that 50 percent or more of their funds came from grants or contracts from outside sources. In another study involving 40 instructional improvement centers (IIC) in institutions of higher education, Bratton (1978) found that:

Eleven centers (42%) reported that their entire operating budgets came from their institution's hard dollars, while only one director (4%) reported total reliance upon nonuniversity financial support. The other 14 centers (54%) reported that their budgets were supported by some mix of university, government and private funding, with half of these (27%, or 7 centers) reporting that university funds made up 75% or more of this mix in their case. It is interesting to note that while only two of the newer centers relied on federal or state government grants, seven of the older centers used these sources. On the other hand, while seven of the newer centers made use of foundations or private grants, only two of the older centers did so. (p.146)

In Berman and McLaughlin (1976) study of four large projects sponsored by the U.S. Office of Education (1. Elementary and Secondary Education Act Title III, Innovation project; 2. Elementary and Secondary Education Act VII, Bilingual projects; 3. Vocational Education Act 1968 Amendments Part D, Exemplary Programs; 4. Right to Read) we can read:

Many projects in our sample received financial assistance from state, local and foundation sources in addition to federal funds. Both the absolute amount of money available to projects and the project per-pupil expenditure varied considerably. Nonetheless, other things being equal, variations in the funding level, the number of students served, and the concentration of funding had small and

generally not significant effects on project outcomes.

This finding casts doubt on the possibility of using outside funding, whether administered by the federal government or state education agencies, as a finely tuned policy instrument. However, it does not imply that the injection of federal funds was inconsequential. On the contrary, our respondent strongly indicated that many of the innovations attempted would not have been possible without initial outside financial support. Our sense of the general political and economic constraints on school districts supports this view. (p.357)

There is growing evidence that most planned attempts at change in schools fail. A recent Rand Corporation study (Berman and McLaughlin, 1978) indicated that Federally funded school innovations quickly disappear after the seed money stops. An Educational Testing Service evaluation study (Murphy and Appel, 1977) found that computer teaching systems have no significant impact on achievement. And each agent can probably add to this evidence from their own attempts at change. In another study done by Pelavin, Johnston and Shefter (1980) we can have a more optimistic view:

For purpose of this analysis, a project was considered to be institutionalized if it met all three of the following criteria: (1) it continued to exist after the Fund's support ended; (2) its activities or services were not substantially reduced; and (3) the project was optimistic about its prospects for long-term (five or more years) survival. Seventy percent of the 271 projects that had continuation potential met all three criteria; thus 70 percent of the projects that attempted to become institutionalized have actually succeeded. Among the projects that have been completed for at least two years, 55 percent have become institutionalized. While this figure is slightly lower than that for all completed projects, it is still substantially higher than the Berman and McLaughlin estimates of institutionalization among other educational change agents. (pp.16-17)

There is another conclusion to explain the low levels of implementation of externally funded projects. Orlich (1979) wrote:

Rand researchers analyzed the apparent motives of those who applied for ESEA monies. Berman and McLaughlin (1978) described school district applicants as being divided into two groups: (a) "Opportunists", those who went for the change to get some federal money because it was there or (b) "problem-solvers", those who could use the federal money to improve a local situation. These motives from the extensive 8-volume Rand study are supported by an earlier Ford Foundation (1972) report: A Foundation Goes to School. The Ford writers noted that after the Ford Foundation had spent about \$50 million supporting educational innovations during the decade of the 1960's, their funded projects were not as important to the school recipients as "business as usual". (p.6)

Most of the literature related to funding the projects agree that outside funds did not appear to induce educational institutions to experiment or to take risks with significant innovations. Instead, they took advantage of the availability of these funds to support temporary add-ons or to finance practices for which prior commitments to solve a local problem existed. Berman and McLaughlin (1976) say:

In particular, reports from local project staff as well as our field observations clearly indicate that the availability of federal funds made many projects possible that simply could not have been initiated solely on a district's limited budget. Moreover, the three categorical programs usually promoted local projects that were congruent with their federal categorical priorities. (pp.362-63)

External sources of funds help to initiate a project but its effect on implementation and continuation is limited. Havlock and Huberman (1978), studying educational problems in

developing countries mention:

Another rationale for outside assistance is the "initiating" strategy, the idea that innovations can be sustained with internal resources if they are only initiated with outside funds--presumably initiated to the point where all can see their benefits. Unfortunately, this strategy in its most naive form almost always leads to nothing. One essential ingredient has to be a national capacity and commitment to carry on after the initial period. In case after case we find no such capacity. (p.173)

Schramm (1973), for example, speaks of the necessity of initial outside support for all the instructional television projects he studied:

None of these projects could have gone forward successfully without substantial support--financial, logistic, and technical--from outside. This raises the question of whether such "forced feeding" is the best way to encourage national educational reform, or whether a simpler, less expensive method, supportable largely by local resources, might be more lasting even if somewhat slower. For example, one reason the Niger project stalled after reaching 20 classrooms was the feeling of the host government that its budget would not support a broad expansion. Similarly, the ITV station that Unesco helped build in Senegal went dark when the Unesco project ended. This seems wasteful of resources. On the other hand, both El Salvador and the Ivory Coast will probably be able to absorb the cost and technical demands of their national projects, although outside help was required to get them started; and American Samoa has accomplished the rather remarkable feat of Samoanizing its educational system in only eight years. (p.98)

Some suggestions can be found in literature aiming to reduce opportunism and more important, aim to increase the educational organizations' receptivity to change. Berman and McLaughlin (1976) suggest:

Before a project goes through its implementation stage, both funding agencies and local innovators

experience considerable uncertainty about the risk and benefits of a proposed innovation--uncertainty that can only be resolved by a trial implementation. By making funds available in such a way as to reinforce the trial aspect of implementation, federal policy might encourage schools to experiment and take risks--behavior that we found rarely occurred. (p.368)

Havelock and Huberman (1978) also support this idea. They wrote:

Another related approach is the "pilot project" strategy. Here the idea is that a model project can be created on a small scale using the best planning, technical assistance and substantial infusions of foreign capital. When this "pilot" is shown to be successful, it will either be taken up automatically both by other areas within the country because of its apparent success or the government will realize that a national policy should be established to this end. (p.173)

Incorporation of change involves the most serious commitment on the part of the educational institution, as external "seed money" is withdrawn and decisions must be made about not only whether but also what components of and on what scale a project should be continued within the organization. In the following section of this review, the effects of size and magnitude of the change projects will be taken into consideration.

The Size and Magnitude of Change Projects

Orlich (1979) in his review of educational innovations concludes that "the size of the projects is unrelated to its success". (p.6) As evidence he mentioned that both the Ford Foundation (1972) and Berman and McLaughlin (1978) report that size, duration, and impact of smaller grants has as

much impact as the larger ones. The distinction between large and small is also vague. Havelock and Huberman (1978) wrote:

The magnitude of financial resources invested in a project probably represents a crude but valid measure of the magnitude of a project over-all. This is perhaps the safest generalization which can be offered, but it does not convey very much. It also has limitations in that some (not many) projects can be large in many respects, e.g. numbers trained, and still be small in financial investment, while others can be large in financial investment and small in some other important respects, e.g. the region served, numbers affected, etc. All this is only to say that the measure is crude. (pp.168-69)

In higher education settings the exact nature of individual change programs depends partly on the institution's financial capacity and partly on the extent of services offered by instructional improvement centers within that institution. Reviewing the literature on instructional development shows that there is no universally accepted size for innovation projects within the field of instructional development. Alexander and Yelon (1972) summarized the choices facing an instructional development agency:

An instructional development agency can invest its resources--time, energy, and money--in a large number of small projects or in fewer, more comprehensive projects. The choice of project size should depend on its impact. A large number of relatively small instructional projects produces an impact on many departments. Fewer, larger projects produce large changes within the target departments. The main criterion is the estimated probability of success. Projects that produce no definite results, or that are not implemented, produce frustration and disillusionment. (p.13)

Diamond et al. (1975) and Diamond (1971) have

consistently argued that the goal of instructional development should be to have maximum impact on the instructional programs of an institution. To do this they suggest that development agencies should identify the top priorities of an institution and choose projects which reflect these priorities. The strategy they advise is to complete a few major projects which will have widespread impact rather than to support numerous small projects which have little overall impact on the nature of the academic program.

Hamreus (1971) identified three sizes of instructional development projects that he felt were usually developed:

1. The package size, which is self-contained and can be purchased and inserted in a course by a teacher either as a supplemental element or to replace some specific lesson segment;
2. The component size, which constitutes a major unit of study in a course and which must be designed to dovetail nicely with that which already exists; and
3. The total system size, which is usually a total course or even a curriculum and either replaces an existing one or creates a new one. (p.10)

Instructional development is only part of the concept of change. In this respect Grimes and Doyle (1971) commented that:

There is also a sense of something missing when one tries to relate Instructional Development to the larger question of the process of providing positive change in education...Instructional Development, as it is currently being discussed, is really much closer to the process of instructional design than to the broader concept of educational design (consequently) the proper context in which to consider development as a concept is within the overarching context of the change process in education. (p.53)

In Berman and McLaughlin (1976) we can read that regardless of size, innovative projects which are congruent with the needs of educational organizations have a better chance to get roots:

Whether an innovation was perceived as central to the district's priorities or as ancillary appears to have affected the interest and commitment of project participants at all levels. Projects initiated in a problem-solving fashion were, by their very nature, central, whereas opportunity-based projects tended to be ancillary. We found that the more central an innovation was, the more likely it was to be continued by the district using its own resources. This finding is particularly significant because it held even controlling for the cost and perceived success of the project. That is, projects with high district priority were likely to be continued even in cases when they had not been relatively successful during their temporary federal funding period and when they were expensive for the district. Ancillary projects tended to be add-ons to district practices and were not likely to be continued. (p.358)

Finally, it should be mentioned here that the complexity of the educational community itself is a factor in preventing educational changes from taking root. An educational institution is an elaborate organizational system. Many failures of promising innovations occur simply because their promoters fail to take into account the fact that a change in one part of a complex, interconnected system generate changes in all other parts. A change which seems to improve one part can have unexpected effects on other parts which far outweigh the intended improvement. More often, a proposed change never gets off the ground because educators can foresee some of the unexpected effects and abort the change

at once. Studying characteristics of innovations help those involved in innovative projects and change agents to partially prevent failure of change efforts.

Studies on Characteristics of Innovations

Characteristics of innovation have received considerable attention in the literature; however, the reported research generally focus on the product, rather than on the process, of innovation (SRC 1976). Even though characteristics of innovations have been discussed often, not much attention has been given to the process through which they are originated and developed.

Many researchers have compiled and discussed lists describing the characteristics of innovations. The best known and most commonly used, of course, is Rogers and Shoemaker's (1971) list described in Chapter I. Another example of such a list has been compiled and described by Chin (1974). He describes the following as being important:

1. Cost - financial
2. Cost - social
3. Return on the investment - short term/long term
4. Efficiency - time saving, ability to reach desired ends, and relief from present state
5. Perceived Risk
6. Communicability - clarity of results, transformation
7. Compatability with existing activities
8. Complexity

9. Perceived relative advantages, including visibility
10. Structural radicalness
11. Terminality - time period for repeating cycle
12. Reversability
13. Divisibility of innovation practice
14. Commitment required
15. Publicness vs. privateness
16. Adoption variables such as decision-making bodies needed
17. Susceptibility to successive modification
18. Gateway ability - opening the gate for other innovations
19. Ego involvement

Chin explained this list by saying that it is not clear yet whether these dimensions are perceived by the adopter or are intervening variables used to explain adoption/non-adoption. But, these dimensions can be used as the beginnings of a construct-theoretic system for research.

Huberman (1973) observed that innovations are rarely adopted on their merits. The main factor appears to be the relative importance attached to the anticipated advantage of the innovation. Huberman's list of factors which he says either appear to favor or impede durable changes are:

1. Low cost
2. Proven quality
3. Divisibility into parts
4. Ease of communicability
5. Low complexity
6. Strong leadership or sponsorship

7. A favorable rather than neutral or inhibiting school or institutional environment
8. Compatibility with the values and existing practices of the adopters
9. Effective mixture of rewards and punishment
10. Readiness of change in the target group
11. Appropriateness of the proposed change to the surrounding communities

In a study conducted by Hull and Kester (1974) a list of innovation characteristics critical to the successful adoption of programs was developed. The most important characteristics included:

1. Installation and maintenance costs
2. Availability of dollars for installation
3. Quality of staff needed to install and operate the innovation
4. Space required for the innovation
5. Lead time necessary for adequate installation
6. Sources of dollars necessary for operation
7. Hardware required for the innovation
8. Complexity of the innovation

Among the least important characteristics determined by Hull and Kester was divisibility.

Participants at the National Seminar on the Diffusion of New Instructional Materials and Practices (1973) which was attended by many researchers in the diffusion area, concluded the following were important characteristics for the adoption of innovations:

1. The product must show imagination

2. The product must be presented in an exciting manner
3. The product should not require special equipment to adapt it to a setting
4. Product completeness is more important than size
5. How widespread is its use already
6. Compatibility with
 - a. school needs
 - b. previous experience
 - c. present values
7. Cost as a factor depends on the wealth of the school district and amount of Federal Funds available
8. Ease of adoption
9. Completeness
10. Respectability of developer.

Upon reviewing these lists it becomes apparent that they have many similarities. If one were to operationalize the five attributes described by Rogers and Shoemaker many of the above described attributes would appear as their subsets. This raises two possibilities. First, if these attributes are based on research in education then they would tend to support the characteristics originally described by Rogers and Shoemaker. Second, if they are based on Rogers and Shoemaker's attributes and are merely an operationalized subset of them, then their validity for application to educational purposes must be questioned. Unfortunately it would appear that the latter case is true.

Basic Theoretical Foundations for this Study

In their investigative work Rogers and Shoemaker (1971) provide a compressed, synthesized model of the main elements in the diffusion of new ideas. They state:

The main elements in the diffusion of new ideas are (1) the innovation, (2) which is communicated through certain channels, (3) over time, (4) among the members of a social system. An innovation is an idea, practice, or object perceived as new by an individual. The characteristics of an innovation, as perceived by the members of a social system, determine its rate of adoption. Five attributes of innovations are: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability. (p.39).

This research investigation is directed toward relative significance of the five attributes of innovations identified in this theoretical model.

Writing about the relatively uncharted area of knowledge as to how innovations in education can be effectively diffused, Chow, Hutchins and Sikorski (1973) state: "The impact of innovations can be optimized in our opinion, by studying the relationship of innovative behavior to three classes of variables: user characteristic variables, innovation attribute variables, and diffusion strategy variables." For each of these variable sets, these authors believe that "research literature is uneven because it has ignored the social/institutional nature of schools and has treated the innovative process as though it were similar to mass consumer behavior where the individual has relative autonomy in responding to the simple messages about relatively simple

products." The authors recommend that diffusion strategies will be optimized when the interaction effects of user characteristics, innovation attributes, and diffusion strategies are examined "as they relate to innovative behavior and as these variables are influenced by environmental constraints." (p.12)

The second class of variables, innovation attribute variables, is an essential focus of this study. According to these authors, innovation attributes have been examined in a variety of contexts although, as they observed, education has contributed very little to that literature.

Carlson (1965) has suggested, the rates of adoption and diffusion have depended on two sets of characteristics, (1) those of the adopting unit, and (2) those of the innovation. The literature on educational innovation, in the words of Doyle and Ponder (1978), embodies a singular dichotomy:

There is, on the one hand, a voluminous collection of prescriptive literature-strategies for educational innovation that purport to tell practitioners how to accomplish change in concrete school settings. On the other hand, there is a growing body of descriptive studies which indicate that the actual amount of change in schools falls significantly below expectations. The life histories of innovation projects are, more often than not, records of disappointment and failure. Indeed, it seems that few authors of strategies for innovation can point to solid evidence that their particular set of porcedures has in fact produced fundamental changes in the regularities of schooling. (p.1)

Diffusion research leading to derivation of generalization among the studies available in the Diffusion Document Center (then at Michigan State University), reviewed

by Rogers and Shoemaker (1971), report that there is no generalization in which the dependent variable is characteristic of an innovation per se, and there are only 82 studies, 1.2% dealing with rate of adoption and related to attributes of innovation, while in the same review we find more than 58% of the studies deal with innovativeness of members of a social system, related to characteristics of members. (pp.72-73)

According to Carlson (1965), "the adoption performance on one innovation is not necessarily a reliable predictor of adoption performance on another innovation or several other innovations." (p.53)

Havelock (1976) indicates that:

Adopting may be followed by discontinuance, discontinuance by readoption, and rejection by later adoption. A further possibility is partial adoption or adoption in a revised form...Discontinuation, or subsequent rejection of an innovation after initial adoption is reported by Rogers (1962) as a common phenomenon, varying with the nature of both the innovation and the adopter. (pp.10-71,72)

It is the characteristics of innovation that are related to diffusion, adoption and acceptance of innovation. The terms "adoption" and "acceptance" imply two different meanings, though they are very close. Acceptance, as defined before, is: "reported willingness to utilize an innovation in practice." For adoption you will find several definitions: Rogers has two definitions, (1) "a decision to continue full-scale use of innovation." (Rogers, 1962, p.38), and (2) "a decision to make full use of a new idea as the best course of action available." (Rogers & Shoemaker, 1971, p.61)

Adoption may occur under pressure of authorities, which is different from acceptance as it is used here. Acceptance is more stable than adoption.

Zaltman, Florio, and Sikorski (1977) quote a salesman saying: "when the innovation and school district are such that authorization is necessary by the school superintendent and then again by the school principal before I can talk with teachers, I simply forget about that product for that school district. (p.42)

Havelock and Huberman (1978) in presenting a model combined of Infrastructure, Authority and Consensus (The IAC Model) to solving educational problems, wrote:

A number of clinical studies show that people who are unwilling to do something (C-) find innumerable ways of conforming superficially to the request or orders of their superiors (assuming A+) even while they resist those orders or take up their former behavior patterns when they are not being supervised. Innovations in education are particularly vulnerable to this phenomenon in that people have more and better occasion for resistance. (p.81)

These views correspond with Rogers' contention that the perceptions of the characteristics of an innovation by individuals in a social system affect its adoption.

To a large degree characteristics of innovations predetermine the rate of adoption and acceptance. An analysis of such attributes, following the lead of Rogers, could be of value to change agents seeking to base their strategies on diffusion research findings, and thus anticipate the reactions of potential adoptors.

Contributions of the Related Research to this Study

Six generalizations seem justified in light of research reviewed:

1. Most studies tend to focus on the user and the process for adoption but give little attention to the perceived characteristics of the innovation.
2. When characteristics of educational products are described they are basically in agreement with Rogers five characteristics. Some lists might go into sub-attributes but they serve as a function of the original five.
3. Most change theorists feel that since school systems serve society they have different needs than independent users of innovations (i.e. agriculture, medicine, etc.). Therefore, it is not appropriate to generalize from these areas to education.
4. Cost and budgetary problems do not seem to be a prime deterrent to the success of innovations.
5. The degree to which teachers understand and agree with the use of a product tends to be an important part of product success (i.e. teachers are the most important part of the adoption system and most overlooked).
6. Few studies have been completed on the study of the perceived attributes of innovations. Those that have been carried out have assumed that the attributes described by Rogers and Shoemaker are appropriate for education and have drawn these conclusions based on this assumption.

Points three and six highlight an assumption, often made, which may be erroneous. Since the distinction is important, further discussion of the assumption is offered.

Given differences in the structure of disciplines which comprise the diffusion research tradition, it is not unreasonable to believe diffusion research generalizations which apply in the one discipline may not apply to all others. For example, education has social motives and results in an intangible product while such areas as agriculture and

medicine consist of individuals with a profit motive who produce tangible products.

Guba (1965) has described six general factors as to why research in other disciplines cannot be directly applied to education. These are:

1. In most reported research, the change or motivation in question is accepted or rejected by an individual entrepreneur (e.g. farmer); in education we are concerned about acceptance by an agent of a bureaucratic social system.
2. Decisions for change that have been studied are typically individual or family decisions; in education we are concerned with collective social systems.
3. Sources of information about innovations in many study areas are well institutionalized (e.g. agricultural extension); this is not true in education.
4. Most innovations in other fields are based on research evidence and are thoroughly tested before being made generally available (e.g. through the agricultural experimentation station); this is not true in education.
5. Most innovations in other areas are diffused through institutional change agents (e.g. the county extension agent); few institutionalized change agents exist in education.
6. The incentive for the adoption of most studied innovations is economic (e.g. more bushels per acre); the economic incentive, while not eliminated in education, is replaced to a certain degree by a social motive.

These findings are also supported by Eicholz and Rogers (1964).

While the reasons cited above are legitimate there are still many common areas which have been developed across disciplines. These areas have been defined by Eicholz and Rogers (1964) and supported by Lionberger (1968). They are:

1. The innovation, defined as an idea perceived as new by the individual.
2. The communication of the innovation from one individual to another.
3. The diffusion (defined as the process by which an idea spreads) of an innovation through a social system, defined as population of individuals. The system may be comprised of farmers, aborigines, doctors or teachers.
4. Diffusion occurs over time. Not all individuals adopt an innovation at the same time, and can therefore be categorized according to the rate they adopt an innovation. Adopter categories are innovators, early adopters, early majority, late majority, and laggards or non-users.
5. The time at which any given individual becomes an actual adopter depends upon two factors: (1) how quickly he passes through the forms of adoption and rejections (ignorance, suspended judgment, situational, personal, and experimental) and (2) the pre-disposition of the individual to either the adopters or the rejection process.

This study selected the set of characteristics of innovations included in Rogers and Shoemaker's book and subjected each characteristic to a test using data derived from an educational environment, in order to examine the relative influence of these premises.

CHAPTER III

METHODOLOGY

The Purpose of the Study

The purpose of this study was to contribute through empirical procedures to find the relative significance of a set of attributes of innovation identified by Rogers in his paradigm of variables determining the acceptance of innovations, as they effect adoption in institutions of higher learning. The study focuses on five characteristics of innovations (relative advantage, compatibility, complexity, observability, and trialability) in relation to their acceptance. The study also focuses on the life span and stability of the projects under study and their relationship to the attributes. Life span and stability of the projects will be considered and tested in terms of their continuation and/or discontinuation and also in terms of the degrees of the acceptance--High/Low acceptance--by project directors and co-directors. The effect of the five perceived attributes will be tested on these variables, to reveal their relative significances.

With these purposes as a focus this chapter describes the design and procedure used in this study, containing statements of hypotheses to be tested, description of

population and selection of sample, instrumentation and description of dependent and independent variables, data collection procedures and statistical techniques used to analyze and interpret the data.

Hypotheses

The general hypothesis of this study was based on this question: "Do characteristics of an innovation as perceived by instructors affect the degree of its acceptability?" Given that indications from the literature convey a positive answer, then the following null hypotheses, based on research hypotheses presented in Chapter I, were formulated to be tested.

Null hypotheses

- H₁ : College instructors' perceptions of the degree of the relative advantage of innovations will not be related to their acceptance of innovations.
- H₂ : College instructors' perceptions of the degree of the compatibility of innovations will not be related to their acceptance of innovations.
- H₃ : College instructors' perceptions of the degree of the complexity of innovations will not be related to their acceptance of innovations.
- H₄ : College instructors' perceptions of the degree of the trialability of innovations will not be related to their

acceptance of innovations

H₅ : College instructors' perceptions of the degree of the observability of innovations will not be related to their acceptance of innovations.

H₆ : There will be no significant difference between the mean scores on specific attributes of innovations with respect to their continuation vs. discontinuation.

H₇ : There will be no significant difference between the high and low scores on acceptability of innovations with respect to specific attributes of innovations.

Selection of the Sample

The selected location of this study was Michigan State University. The study population consisted of the Educational Development Program (EDP) projects of 1975-1979. The project coordinators were the respondents for obtaining the required information.

To obtain the list of the EDP projects, the annual publications of Educational Development at Michigan State University for the years 1975-1979 were searched. The publications contain compendiums of reports describing educational development in the disciplines and professional schools at Michigan State.

There were two kinds of projects; (1) those projects funded by EDP, and (2) projects not funded by EDP but which

affect educational development. The second group was not included in the sampling. The following table shows the number of the projects in each year.

TABLE 3.1
EDP Projects: 1975 through 1979

Year	75	76	77	78	79	Total
EDP funded	31	32	38	44	35	180
Non EDP funded	10	6	6	1	0	23

Out of 180 projects, 25 were continuations of previous projects and 25 projects had directors involved in more than one project. Excluding these fifty projects there remained 130 projects from which a sample of 50 was drawn randomly (the names of the projects were written on pieces of paper, put in a bowl, and drawn one by one without replacement), so the ratio of sample to population is 1 per 2.6. Because of uncertainty of access to all project directors at Michigan State, a reserve random sample of twenty was also selected to replace those projects in the main sample where their project directors were not available at the time of study. (A list of projects with project summaries and the names of project directors are provided in Appendix A.)

Instrumentation

One of the significant elements intended in this study was the development of an instrument in the form of a

questionnaire (Appendix B) to verify a set of perceived attributes of innovations identified by Rogers. It is hoped that the provision of this practical framework will be useful to change agents as a base for planning strategies for adoption and diffusion of educational innovations.

Major Advantages of the Questionnaire

As a data gathering technique, the questionnaire is perhaps the most commonly used research device. The Likert procedure used for this study is an attitudinal measurement which allows subjects to express their own attitude on a continuum for each statement. The selection of the Likert (1932) procedure is based on several advantages.

Scoring of the questionnaire using Likert scales, for example, is relatively simple, and, according to Oppenheim (1966) "more complex scoring methods have been shown to possess no advantage." Efficient use of time is another important consideration in selecting a questionnaire as a measurement instrument. In gathering data from university faculties who are frequently pressured for time, efficient use of time for data collection may be critical.

The relative economy in designing and applying the questionnaire as compared, for example, with an interview approach, were factors significant to the selection of the questionnaire procedure.

Another advantage attributable to a questionnaire may be the anonymity felt by the respondent. Some respondents

may feel uncomfortable if responses are associated with them and, therefore, unless anonymity is preserved, they would not freely respond. In general, such anonymity is obtainable by having respondents leave the questionnaire unsigned, a procedure that was followed in this study.

Major Disadvantages of the Questionnaire

The problem of validity of attitudinal measures is a critical one intensified by pressures and conditions existent at the time the questionnaire is administered. Oppenheim (1966) points out:

We may conclude, therefore, that failure to predict a particular action does not constitute proof that the attitude scale was invalid. The scale may well have given valid and accurate measures of a given attitude and correctly described the individual's response tendencies. These may, however, have been offset or nullified by other tendencies (which have gone unmeasured) and by his perception of the environment at that time (which, likewise, has not been taken into account).
p.141

Stresses on the system, role expectations, needs to conform, and other environmental determinants do have an impact on individual perceptions and responses. It is highly likely that countless independent variables that influenced the faculties' perceptions and responses in this investigation cannot be altogether accounted for.

Scriven (1967) points out that "some value judgments are essentially assertions about fundamental personal preference (matter of taste) and as such are factual claims which

can be established or refuted by ordinary (though sometimes not easy) procedures of psychological investigation. The process of establishing this kind of claim does not show that it is right or wrong for everyone to hold these values; it only shows that it is true that somebody does or does not hold them.

Thus it is the contention that, while limitations and disadvantages are present in the use of the questionnaire designed for this study, the responses are assertions about personal perceptions and, as such, provide us with useful information.

Construction of the Questionnaire

Perceptions of the characteristics of the EDP' projects as innovations were gathered through the use of an attitudinal questionnaire, as the instrument. A list of eighty items was assembled initially. The items were derived from generalizations and indicators of the five perceived attributes of innovations believed to determine the acceptance of innovations.

The overall design for the questionnaire resembled the Likert scale in form. According to Oppenheim (1966), "the Likert scales tend to perform very well when it comes to a reliable, rough ordering of people with regard to a particular attitude."

The initial eighty-item questionnaire was submitted to a panel of five university professors, as judges, along with

the definitions of the variables to be measured for judgment on validity of the questions. Moser (1971) points out "the assessment of content validity is essentially a matter of judgment; the judgment may be made by the surveyor or, better yet, by a team of judges engaged for the purpose." (p.356)

The judges were asked to rate the items on a scale of one through five as they judged the items would measure the intended variables. In the second step the highest scored items were selected and arranged as an instrument. This new version of the instrument was tried on a small scale to assess the clarity of the items and the time necessary for a respondent to finish it. It was found that some items needed to be revised for more clarification. Finally a 42 item questionnaire constituted the instrument for this study.

(Appendix B)

Variables

The major purpose of this study was to find and describe the correlates of acceptance of an educational innovation with regard to attributes of innovation presented by Rogers (1971).

Table 3.2 lists the independent and dependent variables related to this study

The independent variables are the attributes of innovations as presented by Rogers and Shoemaker (1971). The subdimensions are derived from generalizations given by Rogers and the researchers' review of the literature on

TABLE 3.2

List of Independent and Dependent Variables

Independent Variables	Dependent Variables
A. RELATIVE ADVANTAGE 1. Improvement on past ideas 2. Efficient use of time/effort 3. Student satisfaction 4. Economic advantages 5. Student benefit 6. Diverse teaching materials 7. Ease of use 8. Flexibility of program B. COMPATIBILITY 1. Congruency with system's needs 2. Less change required in system 3. Consistency with values 4. Similarity with other projects 5. Time/resources made available 6. Participate in decision making 7. Congruency with teaching needs 8. Congruency with students needs C. TRIALABILITY 1. Opportunity for small scale trial 2. Option of choice based on tryouts 3. Experimentation on limited basis 4. Utilitarian value of innovation, discovered through initial period 5. Built-in trial stage in the process D. COMPLEXITY 1. Difficult to understand 2. Complicated 3. Hard to use 4. Requiring much change in procedure 5. Need for more material/equipment 6. Need for more preparation time E. OBSERVABILITY 1. Visible results 2. Communicable to others 3. Feedback received from students on its effects 4. Feedback received from department with respect to its effects 5. Feedback received from other faculty regarding willingness to participate in such a program	F. ACCEPTANCE 1. General positive attitude at any point in time 2. General positive attitude toward similar innovations 3. Positive attitude after being knowledgeable 4. Positive attitude after adoption 5. Routinization of practice G. LIFE SPAN/STABILITY 1. Continuation 2. Discontinuation 3. High acceptability 4. Low acceptability

diffusion of innovations, which is an attempt to develop a practical framework based on subattributes of educational innovations drawn from the literature and matched with the relevant generalizations from Rogers and Shoemaker. Apart from the attributes, the instrument also measures the age, the degree of changes, and stability of the projects. In the final instrument there is one question for each subdimension of the attributes. (For more detailed information on the attributes and their definitions as it is used in this study see Appendix C.)

Statistical Measures and Analysis Procedure

Zero-order correlation and partial correlation analysis are the most frequent measurement techniques used in studies of diffusion of innovation and supported by the literature. Borg and Gall (1979) wrote:

In studies that are primarily concerned with measuring relationships, various types of correlation coefficients are employed for statistical analysis. Correlational techniques that compare scores on two variables and ignore the influence of other variables upon the two being compared are called zero-order correlations. A variety of zero-order correlational techniques are appropriate for different kinds of data normally collected in educational research... In some relationship studies the investigator wishes to study the relationship between two variables while holding constant or removing the effect of other variables... Under these conditions a technique called partial correlation is employed. (pp.40-41)

Issac and Michael (1971) believe that a major advantage of correlational research is that the investigator can explore a wide variety of different relationships in the same study.

On limitations of this approach they mention:

- a) It only identifies what goes with what--it does not necessarily identify cause-and-effect relationships.
- b) It is less rigorous than the experimental approach because it exercises less control over the independent variables.
- c) It is prone to identify spurious relational patterns or elements which have little or no reliability or validity.
- d) The relational patterns are often arbitrary and ambiguous. (p.21)

The data for this study was collected through a scaled questionnaire sent to faculty acting as EDP project directors. Respondents were asked to indicate their acceptance of the innovation, on categories of "high acceptability" through "low acceptability", in terms of willingness to use, and actual practice of the innovation.

Then, the respondents were asked to designate their attitudes regarding the relative advantage, compatibility, complexity, trialability, and observability of the innovations. These answers were on a five category response format, based on subdimensions of each of the attributes of innovations.

Numerical weights were assigned to each of the five response categories such that the higher the score the greater the acceptance, relative advantage, compatibility, complexity, trialability, and observability. The weights were as follows:

Strongly agree. . (SA) = 5
 Agree (A) = 4
 Neutral (N) = 3
 Disagree. (D) = 2
 Strongly disagree (SD) = 1

To test the hypotheses, means were computed on acceptance and attributes of innovations. These means were used as the scores in product-moment correlation analysis. This technique examined the explanatory power of each of the five characteristics of innovation on acceptance while fixing or statistically controlling the effects of the other characteristics.

Partial correlation analysis was used to test the relationship between subscores of the attributes and acceptance level as related to each hypothesis. The analysis of data to determine whether predicted relationships, as stated by the hypotheses holds or not, will be presented in Chapter IV.

Additional information from this study--discontinuance, drastic changes, and continuance as initially planned--is reported in terms of frequencies and percentages, as well as an ANOVA test to examine the effect of the specific attributes on continuation vs. discontinuation of the projects. Also in order to compare and determine the degree of relationship between the projects rated high on acceptance level and attributes of innovations, a few examples of each category, on the basis of highest and lowest ratings were chosen and their means were compared in a t test. The results determine

the difference between the relationships of the high level acceptance and the attributes vs. low level acceptance and these attributes.

Method of Data Collection

The final instrument was designed so that respondents could easily check the category which described their perceptions of the attributes of EDP projects, related to their acceptance.

Questionnaires were mailed to respondents in April 1981, accompanied by a personalized cover letter, including the title of the project to which they were asked to respond and relate the questions. The total number of respondents were 72, of which three persons returned the questionnaires unscored, two were assigned in overseas jobs, and two returned the questionnaires with missing data, therefore eliminated from the total sample. In this way the total number of respondents was reduced to 65 persons. Out of this group 40 people completed and returned the questionnaire in the first round, with the rate of return of 61.5 percent, which is considered high. A follow-up letter was sent to those whose responses were not received by May 5, 1981. They were asked to return their responses by May 15, 1981. Ten more answers were received. The rate of response with this follow-up letter reached 76.9 percent, which is considered "very good" by Babbie (1973), "I feel that a response rate of at least 50 percent is adequate for analysis and reporting. A

response rate of at least 60 percent is good. And a response rate of 70 percent or more is very good." (p.165) A telephone call to those who did not respond yet, raised the rate of return to 86 percent, with a total of 56 responses back. (Appendix D contains the cover and follow-up letters.)

Summary

The focus of this study was to measure the degree to which the attributes of innovations, as presented by Rogers, are related to acceptance of innovations. EDP projects of Michigan State University were selected as innovative programs. Acceptance of innovation served as the dependent variable and attributes of innovations as the independent variables. Five hypotheses were derived on the basis of Rogers' generalizations.

The sample consisted of 50 EDP projects, with 72 faculty as project coordinators and respondents. The data were collected through a questionnaire, mailed to respondents with a follow-up letter and a telephone call for those who did not respond to the letters. Total responses returned were from fifty-six faculty involved in 42 projects. In six of the projects both co-directors responded. The statistical measures used to analyze the data were: means, zero-order correlation, partial correlation, reliability coefficient (Cronbach Alfa), t tests, analysis of variance, percentages and frequencies. Chapter IV will include analysis of the data gathered in this study.

CHAPTER IV

DATA ANALYSIS

The primary objective of this research project was to contribute empirically to the findings of the relative significance of a set of attributes of innovations identified by Rogers and Shoemaker in their paradigm of variables determining the rate of adoption (in the case of this study, the degree of acceptance). Specifically, this study is related to the perceived relationship of these attributes to adoption of educational innovations in higher education.

Chapter III presented the methodology used in this study. In this chapter, the results of the investigation will be reported and discussed. The chapter consists of four sections: first, a descriptive analysis of the data; second, data pertaining to each stated hypothesis; third, supplementary analyses of data; and forth, a summary of the analyses.

Descriptive Analysis of the Data

A random sample of 50 innovative projects was selected, with 72 project directors and codirectors working on them. Out of this group, considered as respondents, 56 (being involved in 42 of the projects) returned completed questionnaires, which are used as the basis for this analysis.

A report of the findings of this investigation begins with a summary of the group responses to the set of perceived attributes of innovations. This information is presented in Table 4.1. The percentages and frequencies for the responses "Strongly Agree" (SA) and "Agree" (A) were combined to determine the degree that faculty positively perceived a specific attribute for EDP projects.

Congruently, the percentages and frequencies from rating scores "Disagree" (D) and "Strongly Disagree" (SD) were combined to determine any negative perceptions of a category by the respondents. Table 4.2 shows these percentages and frequencies in their collapsed state. The reason for collapsing the percentages and frequencies was that the number of respondents scoring on both ends of the scale (Strongly Agree and Strongly Disagree) are not enough to be considered representative of the total respondents in the selected sample. In fact, in the scale of "Strongly Disagree" 17 categories have zero number of respondents.

Group Response to Perceived Relative Advantage

The total group response to perceived relative advantage is presented in Table 4.2. Of the total group participating, 87.5% of the faculty acknowledged that their innovation is an improvement on past ideas (only 1.8% disagreed). Seventy-one percent, as opposed to 8.9% agreed that the advantages of "efficient use of time" was in the use of their EDP projects. Eighty-seven and one-half percent observed

Table 4.1

Absolute Frequencies and Percentages of Responses
(Total Group) N=56

	Strongly Agree 5	Agree 4	Neutral 3	Disagree 2	Strongly Disagree 1
A-1	64.3(36)*	23.2(13)	10.7(6)	1.8(1)	0.0(0)
A-2	19.6(11)	51.8(29)	16.1(9)	8.9(5)	0.0(0)
A-3	35.7(20)	51.8(29)	12.5(7)	0.0(0)	0.0(0)
A-4	8.9(5)	35.7(20)	30.4(17)	16.1(9)	8.9(5)
A-5	32.1(18)	33.9(19)	10.7(6)	17.9(10)	5.4(3)
A-6	33.9(19)	44.6(25)	12.5(7)	8.9(5)	0.0(0)
A-7	10.7(6)	25.0(14)	60.7(34)	3.6(2)	0.0(0)
A-8	62.5(35)	28.6(16)	8.9(5)	0.0(0)	0.0(0)
B-1	5.4(3)	39.3(22)	44.6(25)	7.1(4)	3.6(2)
B-2	39.3(22)	41.1(23)	14.3(8)	5.4(3)	0.0(0)
B-3	12.5(7)	35.7(20)	23.2(13)	26.8(15)	1.8(1)
B-4	1.8(1)	3.6(2)	10.7(6)	32.1(18)	51.8(29)
B-5	16.1(9)	58.9(33)	17.9(10)	7.1(4)	0.0(0)
B-6	5.4(3)	30.4(17)	23.2(13)	33.9(19)	7.1(4)
B-7	5.4(3)	33.9(19)	37.5(21)	16.1(9)	7.1(4)
B-8	14.3(8)	41.1(23)	26.8(15)	14.3(8)	3.6(2)
C-1	10.7(6)	51.8(29)	25.0(14)	10.7(6)	1.8(1)
C-2	3.6(2)	32.1(18)	21.4(12)	28.6(16)	14.3(8)
C-3	26.8(15)	42.9(24)	16.1(9)	14.3(8)	0.0(0)
C-4	28.6(16)	60.7(34)	10.7(6)	0.0(0)	0.0(0)
C-5	21.4(12)	32.1(18)	12.5(7)	26.8(15)	7.1(4)
D-1	8.9(5)	30.4(17)	10.7(6)	32.1(18)	17.9(10)
D-2	5.4(3)	32.1(18)	8.9(5)	42.9(24)	10.7(6)
D-3	3.6(2)	21.4(12)	19.6(11)	42.9(24)	12.5(7)
D-4	3.6(2)	16.1(9)	12.5(7)	51.8(29)	16.1(9)
D-5	14.3(8)	35.7(20)	10.7(6)	26.8(15)	12.5(7)
D-6	10.7(6)	30.4(17)	16.1(9)	33.9(19)	8.9(5)
E-1	7.1(4)	42.9(24)	16.1(9)	26.8(15)	7.1(4)
E-2	8.9(5)	32.1(18)	39.3(22)	14.3(8)	5.4(3)
E-3	30.4(17)	51.8(29)	14.3(8)	3.6(2)	0.0(0)
E-4	8.9(5)	14.3(8)	25.0(14)	39.3(22)	12.5(7)
E-5	23.2(13)	37.5(21)	26.8(15)	12.5(7)	0.0(0)
F-1	37.5(21)	51.8(29)	8.9(5)	1.8(1)	0.0(0)
F-2	21.4(12)	58.9(33)	19.6(11)	0.0(0)	0.0(0)
F-3	26.8(15)	53.6(30)	17.9(10)	1.8(1)	0.0(0)
F-4	28.6(16)	51.8(29)	16.1(9)	3.6(2)	0.0(0)
F-5	14.3(8)	60.7(34)	19.6(11)	5.4(3)	0.0(0)

A=Relative advantage; B=Compatibility; C=Triallability; D=Complexity;
E=Observability; F=Acceptance; * Numbers in () are absolute frequencies.

Table 4.2

Combined Absolute Frequencies and Percentages of Responses
(Total Group) N=56

	Strongly Agree + Agree	Neutral	Strongly Disagree + Disagree
A-1	87.5(49)*	10.7(6)	1.8(1)
A-2	68.4(40)	16.1(9)	8.9(5)
A-3	87.5(49)	12.5(7)	0.0(0)
A-4	44.6(25)	30.4(17)	25.0(14)
A-5	66.0(37)	10.7(6)	23.3(13)
A-6	78.5(44)	12.5(7)	8.9(5)
A-7	35.7(20)	60.7(34)	3.6(2)
A-8	91.1(51)	8.9(5)	0.0(0)
B-1	44.7(25)	44.6(25)	10.7(6)
B-2	80.4(45)	14.3(8)	5.4(3)
B-3	48.2(27)	23.2(13)	28.6(16)
B-4	5.4(4)	10.7(6)	83.9(47)
B-5	75.0(42)	17.9(10)	7.1(4)
B-6	35.8(20)	23.2(13)	41.0(23)
B-7	39.3(22)	37.5(21)	23.2(13)
B-8	55.4(31)	26.8(15)	17.9(10)
C-1	62.5(35)	25.0(14)	12.5(7)
C-2	35.7(20)	21.4(12)	42.9(24)
C-3	69.7(39)	16.1(9)	14.3(8)
C-4	89.3(50)	10.7(6)	0.0(0)
C-5	53.5(30)	12.5(7)	33.9(19)
D-1	39.3(22)	10.7(6)	50.0(28)
D-2	37.5(21)	8.9(5)	53.6(30)
D-3	25.0(14)	19.6(11)	55.4(31)
D-4	19.7(11)	12.5(7)	67.9(38)
D-5	50.0(28)	10.7(6)	39.3(22)
D-6	41.1(23)	16.1(9)	42.8(24)
E-1	50.0(28)	16.1(9)	33.9(19)
E-2	41.0(23)	39.3(22)	19.7(11)
E-3	82.2(46)	14.3(8)	3.6(2)
E-4	23.2(13)	25.0(14)	51.8(29)
E-5	60.7(34)	26.8(15)	12.5(7)
F-1	89.3(50)	8.9(5)	1.8(1)
F-2	80.3(45)	19.6(11)	0.0(0)
F-3	80.4(45)	17.9(10)	1.8(1)
F-4	80.4(45)	16.1(9)	3.6(2)
F-5	75.0(42)	19.6(11)	5.4(3)

A=Relative advantage; B=Compatibility; C=Triallability; D=Complexity
E=Observability; F=Acceptance; * Numbers in () are absolute frequencies.

student satisfaction, 66% believed in student benefit from the project, 78.5% acknowledged that their innovation makes available more diverse teaching materials than before, and 91% recognized their projects as more flexible.

However, it should be noted that only 35.7% answered favorably to the ease of use of the project by others, while 60.7% expressed a neutral opinion (N), the highest response in this category. Forty-four and six-tenths percent recognized economic advantage for their projects, as opposed to 25% reporting lack of economic advantage.

In general, it can be stated that respondents' perceptions of the relative advantage of the EDP projects are within the positive range. Table 4.3 shows the correlations of these sub-attributes with acceptance.

Table 4.3
Relationship Between Sub-attributes of
Relative Advantage and Acceptance
(Simple r)

Sub-attributes of Relative Advantage	Significance	Correlation with Acceptance
1. Improvement on past ideas	.001	.45
2. Efficient use of time	.003	.37
3. Student satisfaction	.001	.46
4. Economic advantage	.104	.17
5. Student benefit	.140	.15
6. Diverse teaching materials	.049	.22
7. Ease of use	.384	.04
8. Program's flexibility	.001	.44

Group Response to Perceived Compatibility

In the total group response (Table 4.2, Part B), faculty responded with considerable variability to questions in this category. Almost forty-five percent of the total group agree that their projects are congruent with their departments' needs, while more than 80% agree that there is an adequate fit between the project and the departmental structure. Forty-eight percent responded that the majority of the departmental staff perceived the project positively and only 5.4% considered the project being similar to other activities of their respective departments, while nearly 84% said it was different. Seventy-five percent agreed that their department will provide them limited time and resources, while the group was almost evenly (36% favorable to 41% unfavorable) split with regard to the innovative climate of their departments. On the question of "the college administrators strongly support change efforts of individuals in our department", 39.3% had favorable answers, 37.5% were neutral and more than 23% had an unfavorable perception. For the last item in this category, concerning the attitude of students toward the project, responses are also varied; 55.4% say their students were enthusiastic, 26.8% were neutral toward the effects, and 17.9% did not believe the project had a positive effect on student attitude.

Table 4.4 summarizes the relationship between the sub-attributes in this category and acceptance of the EDP

project, with their relative significance level.

Table 4.4
Relationship Between Sub-attributes of
Compatibility and Acceptance

(Simple r)

Sub-attributes of Compatibility	Significance	Correlation with Acceptance
1. Congruency with system's needs	.133	.15
2. Less change in the system	.003	.36
3. Consistency with values	.001	.46
4. Similarity with other projects	.288	-.07
5. Time/resources made available	.010	.31
6. Innovative climate	.001	.46
7. Congruency with teaching needs	.050	.21
8. Congruency with students needs	.090	.18

In general, we can see that the projects were not considered to be completely fulfilling the recognized departments' needs, they were different from other activities of the departments, and had little effect on students' attitudes. On the other hand, the projects perceived to have caused no major changes in the system, they were consistent with the values, the project directors perceived their climates as innovative and they had time and resources available to work on the projects.

Group Response to Perceived Trialability

In response to sub-dimensions of the trialability variable, (see Table 4.2, Part C), 62.5% of the respondents were engaged in prototype testing and 69.7% stated their department have provided release time for staff to use similar projects on a limited basis. Eighty-nine and three-tenths percent agreed that utilitarian value of the project was recognized during its initial trial period. There was considerable variation in response to the question, "my official assignments left me with insufficient time to try out my project", 35.7% agreed with the statement, 42.9% disagreed, while 21.4% were neutral. As far as the built-in trial stage for the projects was concerned, 53.5% said they had no restriction for planning such a stage, while 33.9% were restricted.

Table 4.5 gives us the relationship between sub-attributes of trialability and acceptance, with their relative significance levels.

Table 4.5

Relationship Between Sub-attributes of
Trialability and Acceptance
(Simple r)

Sub-attributes of Trialability	Significance	Correlation with Acceptance
1. Small scale trial	.001	.46
2. Option of choice (Responsibilities & Trial)	.490	-.0003
3. Limited experimentation	.004	.35
4. Visible utilitarian value	.003	.36
5. Built-in trial stage	.030	.25

In general, it can be stated that respondents' perceptions of the trialability of the EDP projects are within the positive range, indicating that trial on a small scale is important prior to implementation.

Group Response to Perceived Complexity

In the total group response to perceived complexity (see Table 4.2, Part D) only 39.3% considered their project hard to understand, while 50% of the total group found their project complex in a sense that one has to see the project in operation in order to understand it. Thirty-seven percent reported faculty unfamiliar with the project would require special training for the operation of the project and for the same sub-attribute more than 53% considered training unnecessary. When asked whether the outcomes of the project should be revised to reduce complexity, 25% agreed, while 55.4% did not agree. Only 19.7% of the respondents said they had to face substantial changes in the departmental procedures in order to implement their projects, and 27.9% did not have such difficulties. Fifty percent of the respondents reported extra materials and equipment made their projects more complex, while 39.3% of the group did not agree to that. With regard to extra time for preparation, the group was evenly divided, 41.1% agreeing and 42.8% disagreed.

Table 4.6 shows the relationship of complexity sub-attributes and acceptance, with their relative levels of significance.

Table 4.6
Relationship Between Sub-attributes of
Complexity and Acceptance
(Simple r)

Sub-attributes of Complexity	Significance	Correlation with Acceptance
1. Difficult to understand	.320	-.06
2. Complicated process	.180	-.12
3. Hard to use	.050	-.21
4. Requiring much change in procedure	.150	-.14
5. Need for more materials/ equipment	.009	-.31
6. More preparation time	.411	-.03

In general, the data shows that few respondents considered their projects as being complex, and respondents' perceptions of the complexity of the EDP projects are within the negative direction.

Group Response to Perceived Observability

In response to the observability variable (Table 4.2, Part E) we can see more variability and inconsistency in responses. On the question regarding the visible results of the projects, 50% reported similar projects were taking root in their departments and 33.9% did not observe such movements. Forty-one percent reported other faculty inquiring about EDP Grants, while nearly 40% marked their responses as neutral for this question. The highest support in this category, 82.2%, was students' favorable feedback in terms of projects

relevancy to their needs. More than 23% considered some inconveniences for the projects, and nearly 52% believed the advantages were more visible. Finally, 60.7% reported they have records of materials and/or equipment used by the project.

Table 4.7 shows the relationship of sub-attributes of the observability variable to acceptance with their relative significance level.

Table 4.7
Relationship Between Sub-attributes of
Observability and Acceptance
(Simple r)

Sub-attributes of Observability	Significance	Correlation with Acceptance
1. Visible results	.470	.009
2. Communicable to others	.06	.20
3. Student feedback on effects	.19	.12
4. Inconvenience of results vs. advantages	.20	-.11
5. Visible use of materials	.001	.61

In general, the data indicate that responses to perceived observability are not generally high, to support the position that the material dimensions are visible to respondents, but it is in the positive direction.

Analyses of the Research Hypotheses

One of the planned objectives of this study was to develop a measurement instrument to verify a set of perceived

attributes of innovations identified by Rogers. An item analysis that would determine the internal consistency of this measurement instrument was, therefore, a significant step towards achieving this planned objective and in assessing the viability of this instrument as a practical framework for measuring perceived characteristics of an innovation.

The instrument was scored by assigning numerical weights to each of the five response categories such that the higher the score the greater the acceptance, relative advantage, complexity, and the like. In order to estimate the extent of inter-rater agreement on the measures, reliability coefficients were calculated following the procedure suggested by Cronbach (1951), known as Cronbach Alfa. Stability coefficient for the 37 items measuring acceptance, relative advantage, compatibility, complexity, trialability and observability in the instrument was .635 with the Standardized Item Alfa of .758. Reliability coefficients, as judged by Cronbach Alfa, shown in Table 4.8, though not very high, were considered adequate for the purpose of this study.

Table 4.8
Reliability Coefficient for Scaled Items of
Acceptance and Five Characteristics of Innovation
(N=37)

Measure	Cronbach Alfa Coefficient
Acceptance	.681
Relative advantage	.685
Compatibility	.677
Trialability	.687
Complexity	.704
Observability	.688

To test the hypotheses, means were computed on the items related to acceptance, relative advantage, compatibility, complexity, trialability and observability. These means were then used as the scores in partial correlation analysis. This technique examined the explanatory power of each of the five characteristics of innovation on acceptance, while statistically controlling the effects of the other characteristics.

Table 4.9 presents the intercorrelation matrix for the six variables of the study. As the matrix shows, the direction of the correlations of the attributes with acceptance are in the predicted direction and without controlling for other variables, significant at .05 level (with N=56, correlation of .23 is significant at .05 level).

Table 4.9
Matrix of Zero-Order Correlation Coefficients
(N=56)

Variable	1	2	3	4	5	6
1. Acceptance	1.00					
2. Relative advantage	.56	1.00				
3. Compatibility	.51	.54	1.00			
4. Trialability	.39	.24	.45	1.00		
5. Complexity	-.25	-.23	-.35	-.38	1.00	
6. Observability	.34	.39	.52	.08	.17	1.00

In partial correlation analysis, the relationship of each variable with acceptance was measured, while controlling and holding the other variables constant. The result was different and only two hypotheses could be supported.

Table 4.10 shows partial correlation between attributes of innovations and acceptance, relevant to the test of the hypotheses.

Table 4.10
Partial Correlation for Relationship Between
Attributes of Innovation and Acceptance
(N=56)

Variable	Partial r	P
1. Relative advantage	.39*	.002
2. Compatibility	.10	.235
3. Trialability	.24*	.045
4. Complexity	-.06	.347
5. Observability	.12	.207

* Significant at .05

The result of the partial correlation analysis in Table 4.10 shows that the initial prediction that instructors' perception of the degree of the relative advantage would be positively related to their acceptance of innovation is supported. The correlation of .39 is significant beyond the .002 level of significance.

The trialability hypothesis was also sustained. College instructors' perceptions of trialability were found to be positively related to their acceptance of innovation. The partial r of .24 is significant beyond .045 level of significance.

The other three hypotheses could not be supported. The second hypothesis that college instructors' perceptions

of compatibility would be positively related to their acceptance of innovation could not be confirmed. Though, the direction is positive as predicted and zero-order correlation of .50 is significant at .05 level, the partial r of .10 is not significant.

The third hypothesis that college instructors' perceptions of complexity would be negatively related to their acceptance of innovation was not supported. The simple correlation of -.25 is both significant at .05 level and in the direction predicted; however, as it is shown in Table 4.10, the partial correlation of -.06 is not significant, but is in the predicted direction.

The empirical test of the fifth hypothesis, that college instructors' perceptions of the degree of the observability of innovation will be positively related to their acceptance of innovation, reveals that it is not supported. Again, while the zero-order correlation of .34 is significant at .05 level, the partial r of .12 indicates that when other variables are controlled, the relationship is not significant; however, the relationship is in the predicted direction. Table 4.11 will summarize this discussion.

Table 4.11
Expected and Actual Relationship Between
Attributes of Innovations and Acceptance (N=56)

Attribute	Relationship with Acceptance		
	Expected Direction	Simple Correlation	Partial Correlation
1. Relative advantage	+	.56*	.39*
2. Compatibility	+	.50*	.10
3. Complexity	-	-.25*	-.06
4. Trialability	+	.39*	.24*
5. Observability	+	.34*	.12

* Significant at .05

Supplementary Analyses

In Chapter III, it was mentioned that this study will also focus on the life span of the EDP projects, the changes in the projects and the differences between high/low acceptance level as related to the attributes under study. Table 4.12 summarizes the state of the projects under study with regard to the length of time the projects had been active.

Table 4.12
Absolute and Relative Frequencies of the
Projects in the Period of Activity

Length of Time	Absolute Frequency	Relative Frequency (PCT)
Less than one year	3	5.4
1 to 2 years	7	12.5
2 to 3 years	13	23.2
3 to 4 years	12	21.4
4 to 5 years	10	17.5
5 and more years	11	19.5

Out of these projects 12 or 21.4% have gone through major changes, while 44 projects or 78.6% had no drastic changes in their process. On the other hand, 58.9% of the projects (33) were continuing as initially planned, while 41.1% (23) had to undergo some changes to adjust to the departmental conditions.

Almost 1/3 of the projects were discontinued (32.1%), while more than twice that or 67.9% of the projects were functioning. This contradicts the statement from the U.S. Department of Commerce that up to 90% of all innovations

fail within four years after being introduced; as mentioned by Rogers and Shoemaker (1971). It seems that innovations in educational settings are more stable than those in commercial enterprises.

In order to test the effect of the attributes under study with respect to the continuous vs. discontinuous status of the projects, a series of analysis of variance was conducted. The result showed that only two out of five attributes had significant effects. Table 4.13 shows the effect of the attribute of relative advantage.

Table 4.13
Analysis of Variance for Continued/Discontinued
Projects and Relative Advantage Variable

Source	SS	df	MS	F
Between groups	122.9349	1	122.9349	13.2719*
Within groups	500.1901	54	9.2628	
Total	623.1250	55		

*Significant at .05 level

The compatibility attribute had also a significant effect on continued/discontinued state of the projects. Table 4.14 presents this effect.

Table 4.14
Analysis of Variance for Continued/Discontinued
Projects and Compatibility Variable

Source	SS	df	MS	F
Between groups	91.2933	1	91.2933	6.7049*
Within groups	735.2602	54	13.6159	
Total	826.5536	55		

*Significant at .05 level.

The other three attributes (complexity, trialability, and observability) did not have any observably significant effect on continuation of the projects.

In reviewing the responses given to the only open-ended question regarding the reasons for discontinuance of the project, in general, four categories were identified causing the discontinuance: (1) Financial reasons; including cost of materials, termination of EDP funds and lack of departmental and administration financial support. (2) Absence of project director due to retirement, or assignment to other responsibilities. (3) Lack of release time due to extra responsibilities. (4) Rearrangement of the courses.

With respect to the effect of the attributes under study on the projects scoring the highest and lowest on acceptance variable, two groups were selected; first the group whose total scores on the sub-attributes of acceptance was above 23, and another group whose total scores on the same sub-variables was below 18. A t test was conducted to observe which attribute had a significant effect as a source of variation. Table 4.15 shows that relative advantage had a significant impact (at .05 level of significance).

Table 4.15
Mean Scores on Relative Advantage of Innovation
as Obtained from the Two Groups of Respondents

Respondents Group	Frequency	Mean	S.D.	t
Low Acceptance	14	29.21	2.7	-4.08*
High Acceptance	9	33.88	2.5	

* Significant at .05 level (2-tail test)

The t test with respect to relative advantage shows a significant effect as a source of variation between the two groups' means. This effect also existed with respect to the compatibility variable. Table 4.16 presents this effect.

Table 4.16
Mean Scores on Compatibility of Innovation
As Obtained from Two Groups of Respondents

Respondents Group	Frequency	Mean	S.D.	t
Low Acceptance	14	23.92	3.8	-2.52*
High Acceptance	9	28.55	4.9	

* Significant at .05 level (2-tail test)

Table 4.16 shows a significant t value with respect to the compatibility variable as a source of variation between the two groups' means, scoring highest and lowest on acceptance of the EDP projects. The effects of the other three variables (complexity, trialability and observability) were not significant.

Summary

The data obtained from the respondents show that two out of five hypotheses could be confirmed, namely relative advantage and trialability. The relationship of the other three attributes, although in predicted direction, were not significant.

In supplementary analysis, the status of the projects with regard to their continuation/discontinuation, degrees

of changes the projects have gone through, the effects of different attributes on continuation/discontinuation of projects, as well as the effects of these attributes as sources of variation in high/low acceptance level was discussed.

It was found that two variables, relative advantage and compatibility had significant effect. In Chapter V the findings will be summarized and conclusions and recommendations will be presented.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

It has been the purpose of this study to test a set of attributes of innovation identified by Rogers in his paradigm of variables determining the rate of adoption of innovations in terms of acceptance in higher education. Further, in developing a measurement instrument in the form of a questionnaire to test the relative significance of the perceived attributes of innovation, this study intended to provide a practical framework by which the unique characteristics of an innovation may be described and analyzed in relation to the degree of acceptance. To this end, using Rogers and Shoemaker's generalizations as headings, other lists and models of change and innovation in education were searched to derive a set of sub-attributes of innovations which were common across these lists and models. The sub-attributes were then matched with the relevant generalizations of Rogers and Shoemaker. These sub-attributes and their related sources are presented in Appendix C of this report.

Major findings that emerged from this investigation are presented in Chapter IV. In this chapter the study will be summarized and conclusions and recommendations of the research will be stated.

The Problem

Diffusion and utilization of educational knowledge is a unique area of study which seems to be based upon principles derived from research completed in several related social science disciplines. Diffusion and utilization research has been completed and reported primarily in two disciplines--sociology and anthropology. Since circumstances within these disciplines may differ substantially from educational circumstances, the generalization of research validated in sociology or anthropology to education may or may not be valid.

For example, many generalizations have been set forth by rural sociologists who focused upon human interaction patterns within agriculture. Agricultural incentives and outcomes seem to differ from educational incentives and outcomes. It is not unreasonable to believe these differences may confound the transferability of generalizations from one discipline to another.

One way to confront the transferability question is to formulate hypotheses based upon diffusion research reported by sociologists and anthropologists, and then test these hypotheses in educational contexts. Few educational researchers have initiated such inquiry; hence, little is known about the validity of diffusion and utilization generalizations which are applied to educational contexts.

Relationships among characteristics of innovations,

which have predictive utility in sociology and anthropology, and the acceptance/rejection of an educational innovation were highlighted in this study. Data drawn from a random sample of educators pertaining to innovation adoption behavior were analyzed in terms of five important attributes of innovations described by Rogers and Shoemaker (1971). These attributes are: (1) relative advantage, (2) compatibility, (3) trialability, (4) complexity, and (5) observability. Since Rogers and Shoemaker have based much of their data on studies completed in rural sociology, this study set out to determine the relevance of these generalizations to education, specifically, higher education. The results are summarized in Table 5.1.

Perceived Relative Advantage

Faculty perceptions of the "relative advantage" of the EDP projects as an innovation were well within a positive range and significantly related to acceptance, verifying the importance of this attribute identified by Rogers. The evidence from the statistical data with regard to relative advantage reflects less of an interest in "economic advantage" as an indicator of relative advantage than Rogers suggests. The concern of "student benefit" is also not significant to the participants of this investigation. There is also no relation between the acceptance of the innovation and sub-variable "ease-of-use". Elimination of this item from the instrument may improve its effectiveness. Respondents in

Table 5.1
Relationship between Operationalized
Attributes and Acceptance

Attributes of Innovation	Significance*	Relation to Acceptance
A. RELATIVE ADVANTAGE		
1. Improvement on past ideas	yes	positive
2. Efficient use of time	yes	positive
3. Students' satisfaction	yes	positive
4. Economic advantages	no	positive
5. Student benefit	no	positive
6. Diverse teaching materials	yes	positive
7. Ease of use	no	none
8. Programs' flexibility	yes	positive
B. COMPATIBILITY		
1. Congruency with systems' need	no	positive
2. Less changes in the system	yes	positive
3. Consistency with values	yes	positive
4. Similarity with other projects	no	none
5. Time/resources made available	yes	positive
6. Innovative climate	yes	positive
7. Congruency with teaching needs	yes	positive
8. Congruency with students' needs	no	positive
C. TRIALABILITY		
1. Small scale trial	yes	positive
2. Option of choice(responsibilities & trial)	no	none
3. Limited experimentation	yes	positive
4. Visible utilitarian value	yes	positive
5. Built-in trial stage	yes	positive
D. COMPLEXITY		
1. Difficult to understand	no	none
2. Complicated process	no	negative
3. Hard to use	yes	negative
4. Requiring much change in procedure	no	negative
5. Need for more materials/equipment	yes	negative
6. More preparation time	no	none
E. OBSERVABILITY		
1. Visible results	no	none
2. Communicable to others	no	positive
3. Student feedback on effects	no	positive
4. Inconveniences of projects vs. advantages	no	negative
5. Visible use of materials	yes	positive

* Significant at .05 level.

this study agreed that EDP projects were an improvement on past ideas, which corresponds with the generalization given by Rogers and Shoemaker (1971) that perceived relative advantage is the degree an innovation represents an improvement over past ideas.

Although economic advantage was not considered important, efficient use of time was significantly important. Research in other disciplines suggests that the savings of money is important when the adoption of an innovation is being considered. It must be kept in mind, however, that most of the subjects for such research had a profit motive when considering adoption. While educational adopters are not going to spend their hard earned money hapazardly, they also are not out to "make money" through innovation adoption. Therefore, many innovations will cost money to adopt, but it is hoped that they will have many tangible benefits to offset the cost. "Student satisfaction", as confirmed by this study, may be one. Other dimensions may be economic utilization of resources or conservation and diversification of resources, related to achieving instructional objectives.

The respondents perceived that their innovation made more "diverse materials" available and their projects had built into them the "flexibility" of changing to meet new conditions. Both of these two sub-variables were positively related to acceptance and significant.

Perceived Compatibility

Faculty perceptions of the compatibility of the Educational Development Programs (EDP), although within positive range and significant in terms of simple correlation, could not be confirmed when the effects of other attributes were statistically controlled. Thus, the second null hypothesis of no relation between the compatibility and acceptance was not rejected.

Why compatibility was not supported as a factor in innovation acceptance in the present study remains unclear. As data show compatibility had a significant effect on degrees of acceptance and continuation of projects. It might be considered that this is a unique characteristic of the EDP projects related to the process through which these projects will be implemented (see Appendix A for more detail).

In this study considerable variability of responses to the overall category of compatibility is present. The responses indicate that the projects, usually, are not congruent with the target system's needs.

On the other hand, the data indicate that not much change is necessary to accommodate the innovation in the system. These findings are basically in line with Rogers' general view that the more compatible the innovation, the less change is likely to occur over time; as Rogers and Shoemaker (1971) state: "obviously, however, if a new idea were completely congruent with existing practices, there would be no

innovation, at least in the mind of the receiver". (p.147)

The projects were considered to be consistent with the values of the departmental staff and different from other activities in their respective departments. In fact, the item on similarity of the projects with other activities had nearly zero correlation with acceptance. To improve the instrument it might be advisable to remove this item. The respondents agreed that they had an innovative climate, with time and resources, generally available to them to work on their projects. The projects were congruent with teaching needs, but apparently did not respond to students' instructional needs.

The results, with respect to compatibility, of this study correspond with Rogers and Shoemaker's (1971) conclusions, reviewing more than 300 studies. They said: "...Controlling the effects of other attributes of innovations, show compatibility to be of relatively less importance in predicting rate of adoption, than other attributes, such as relative advantage. This result may be in part an artifact of difficulties in measuring perceived compatibility. In most of the studies..., compatibility was found to be positively related to rate of adoption, even though the correlation was often not significant when the effect of other attributes were removed statistically". (pp.152-153) This is what the data obtained in this investigation agree to; however, many other studies have found the compatibility attribute to be significantly related to adoption of innovations.

Further study would be warranted only to determine if components of this attribute are important to the acceptance process.

Perceived Trialability

The findings of this study clearly support the presence of trialability as a characteristic of an innovation as identified by Rogers. Out of five sub-dimensions for this attribute, four were positively and significantly related to acceptance of the EDP projects as expressed by the respondents in this study. The only item in this category which was not significant and received conflicting responses was the extent to which official responsibilities were acting as a preventive force toward the trial of the projects. The respondents were divided to three almost equal groups (agree, disagree, and neutral). As a result of this diversity in response, this sub-attribute had almost a zero correlation with acceptance. To improve the instrument, elimination of this item may be advisable.

With respect to other sub-attributes in this category, data indicate that small scale trial was positively and significantly related to acceptance of innovations. The respondents could engage in limited experimentation with such projects. They agreed that the utilitarian value of their projects was visible in the trial period, and the projects had a built-in stage for trial. All these sub-dimensions were positively and significantly related to acceptance of the

EDP projects.

Based on data obtained in this investigation, the null hypothesis that "college instructors' perceptions of the degree of the trialability of innovations will not be related to their acceptance of innovations", will be rejected.

Perceived Complexity

The data related to perceived complexity of the EDP projects did not support it as a factor in innovation acceptance. The overall relationship obtained was negative, but when the effects of other attributes were statistically controlled the relationship was not significant, although still in the predicted direction. This finding corresponds with studies done by Mort (1964), concluding that "complex innovations appeared to be as acceptable as those that were simple". (p.325) On the other hand, some of the studies reported by Rogers and Shoemaker (1971) found that "the complexity of farm innovations was more highly related in a negative direction to their rate of adoption than any other characteristic of the innovations except relative advantage". (p.154) Explanation of these dissimilar results may be found in differences which exist between education and agriculture in both the context for innovation and the nature of innovations.

Out of the six sub-attributes of the complexity variable tested, two were significant and four were insignificant. The projects were not considered to be difficult to understand, had no complicated processes, did not require much

change in departmental procedures to implement, and were free from devotion of excessive time to prepare the materials for the course.

The projects were considered to be "hard to use" and it was indicated that more materials and equipment were needed to run the projects than were traditionally required. Two items, "difficulty to understand" and "more preparation time", had almost zero correlation with acceptance. Elimination or modification of these two items may help to strengthen the data collecting instrument.

Perceived Observability

The data obtained, with regard to observability, in this study does not support a positive and significant relationship between this attribute and acceptance of the EDP projects. Among the five sub-attributes in this category, only one was significantly related to acceptance in a positive direction and that was "responses to visible use of materials". Two other sub-attributes were positively related to acceptance but not significant. These two sub-attributes are "students' feedback on effect of the projects" and "communicability to others". This latter finding corresponds with the findings of Chesler, et al., (1963) who noted that "in most schools, teachers practice their own methods, rarely hearing or caring if one of their colleagues is experimenting with some new teaching device or technique" (p.169). In this same connection, Willower (1968) found

that instruction was seldom a topic of conversation among teachers. With regard to visible advantages or inconveniences of the projects outcome, the relationship was negative and not significant and in response to visible results of the projects, the respondents were divided half and half, therefore, the response to this sub-attribute had almost a zero correlation with acceptance and was not significant. For further use of the instrument it might be advisable to remove or revise this item.

However, the results obtained from this study indicate that the hypothesized relationship of observability with acceptance of the innovations cannot be accepted.

Additional Findings

The selected sample of this study was from the EDP projects in a five year period (1975-1979). The data reveals that the projects in this period have been more stable than unstable. Less than one-half of the projects had to be adjusted to fit the new situations. With regard to failure due to discontinuance of the projects, the scope is far less than is suggested by the literature. More than two-thirds of the projects studied were functioning as initially planned.

The effects of the attributes under study were tested on the continuation of the projects. Analysis of variance showed that two attributes, relative advantage and compatibility, had a significant effect on the continued/discontinued state of the projects. These two attributes also were

considered as factors effecting the variation between the mean scores of the respondents who scored highest and lowest on the acceptance variable, based on a t test.

In response to the only open ended question in the instrument, four major causes of discontinuance were distinguished. These were (1) financial reasons, (2) absence of the project director, (3) lack of released time, and (4) rearrangement of the courses.

General Conclusions

The essential purpose of this study was to verify Rogers' paradigm of perceived characteristics of an innovation, as related to higher education using the EDP projects as a vehicle for this empirical study.

Two out of five characteristics were found to be significantly related to acceptance of the innovations, when the effects of other attributes were statistically controlled. These two characteristics were relative advantage and trialability. The other three hypotheses were not supported.

However, by only looking at the composite results much important data is overlooked. It becomes apparent that certain sub-attributes provide results compatible with the stated hypotheses while others do not, or provide results contrary to the stated hypotheses. The consequences of this is a neutralization of their effect. The descriptive analysis was able to dissect these divergent results and provide a picture of the individual relationship of the sub-attributes

to accepted innovations, thus providing more useful data.

Rogers and Shoemaker's five basic attributes seem to be agile and flexible enough to provide a basic structure or framework for ordering perceptions. However, while the basic paradigm of attributes provide an agreeable concept of ordering, the list of dimensions indicates these concepts are not altogether conclusive. Some dimensions are validated in this study and in other instances new alternatives can be suggested. This is an area that warrants further examination in order to fully express and adequately measure the dynamic and diverse elements of the innovation process. Using the five attributes identified by Rogers and Shoemaker as an organizing concept, new and alternative dimensions that might be considered are: (1) Relative advantage; relation to goals and priorities of the organization, relation to environmental pressures-needs abatement, conservation and utilization of resources (human and materials), efficiency, risk of professional effectiveness, cost of time and energy. (2) Compatibility; needs abatement, radicalness, accessibility, interpersonal opportunities and constraints. (3) Trialability; divisibility, planned time and resource allotment, risk of time, energy, expertise. (4) Complexity; expertise required, planned time for trial. (5) Observability; communicability to different subsystems.

However, if we anticipate, as we should, that the internal life of subsystems and educational systems are varied, the degree of perceived attributes of an innovation can be

expected to vary, a condition which emphasizes the need for further assessment of these perceptions.

Implications and Recommendations

Yarger and Mallon (1975) have suggested that educational change is difficult to predict and apparently impossible to harness. A look at the last 50 years leads one to believe that educational change has no systematic direction or significant achievement. The results of this study support these beliefs. The fact that three of the five hypotheses were rejected when they have been appropriate for other disciplines support the statement that educational change is difficult to predict.

Rogers and Shoemaker (1971) even admit that "there have been far fewer research studies designed to probe these points (attributes of adopted innovations) than to answer other major questions...the statements here (describing these attributes) are more hypothetical in nature and have fewer empirical claims to support them". (p.135) It must also be noted that most of the data used to support Rogers and Shoemaker's findings are based on research completed in other disciplines. One outcome of this study then supports a posture held by many researchers that understanding of educational knowledge diffusion is rooted in more educationally-based research.

Lists developed by researchers such as Chin (1974), Huberman (1973), and Hull and Kester (1974) describing

attributes of innovations appear to have pooled attributes derived from studies completed in other disciplines. This study suggests available lists of attributes are not entirely appropriate for education. In fact, some of the sub-attributes used proved to be negatively related or had no relationship to acceptance. Further research seems necessary to develop more intrinsic characteristics of accepted innovation. Such research ought to be based upon educationally-based data rather than upon data derived from other disciplines. The sub-attributes determined by this study to be related to acceptance could serve as a base for such a study.

Data provided by this study indicate that adopters of educational products do not behave in the same manner as adopters of innovations in such areas as agriculture or medicine. Once this difference is recognized by change agents, enterprise can be redirected toward behaviors more intimately related to acceptance.

To attain these needs further research related to attributes of innovations is required. Included would be:

1. Replication of the present study in other educational settings.
2. A more detailed study which would highlight relationships of selected attributes to each other when innovations are being considered for adoption.
3. A study based upon more precise operationalization of selected attributes.

The first point, replication of this study, is mentioned because some of the findings of this study may be due to peculiarities of the EDP projects and not applicable to

other settings. Additionally, new data could serve to validate the present findings. Until further study is completed, this study will have to serve as a base for education, since most research completed in this area is based on data obtained from other disciplines. Continued use of the questionnaire is encouraged, with the following changes: (a) broader sampling; (b) restructuring of items to improve internal consistency of the instrument.

The second point, the need for a more detailed study which would focus upon relationships of the attributes to each other, is related to the present study. If the results of this study are to be believed (i.e., the rejection of three of the five hypotheses), then it could be useful to determine the consistency of the characteristics which are present in an innovation when it is accepted or rejected. For example, if relative advantage is considered in the acceptance process when compatibility is ignored, does the process work in reverse? Or, can the attributes be considered separately as Rogers and Shoemaker have suggested? Or, additionally, should some of the sub-attributes under different attributes which appear related be put under a new category?

The last implication, the need for a study which would further operationalize the attributes and use these new sub-attributes as a basis for rating accepted innovations, is necessary for the same reasons the present study was necessary. The operationalized attributes, as presented in this study, in most cases were based on lists of attributes

developed from research completed in other disciplines. More valid results could be obtained from attributes developed from an educational context, since the subsequently operationalized sub-attributes would also be derived from an educational context. Thus, they would more closely meet educational needs. A firm foundation for educational change agents will then be provided, allowing them to move beyond the use of unproven generalizations, which Miles (1964) described as being presently in practice.

APPENDIX A

**AN OVERVIEW OF THE EDUCATIONAL DEVELOPMENT
PROGRAM AT MICHIGAN STATE UNIVERSITY**

AND

**A LIST OF PROJECTS WITH PROJECT SUMMARIES
AND THE NAMES OF PROJECT COORDINATORS**

EDUCATIONAL DEVELOPMENT PROGRAM
AT MICHIGAN STATE UNIVERSITY

Michigan State University's Educational Development Program (EDP) is probably among the best known programs in the United States. In fact, in response to a questionnaire from Jerry Gaff (1975), the MSU program was judged to be among the top three in the United States. As Alexander and Yelon (1972) wrote:

One important cornerstone for the MSU Instructional Development Program was laid in 1952 with the establishment of the institution's first Audiovisual Center. This center was somewhat unique in two respects. The first was that it was established on the basis of several institution-wide faculty committees' recommendations over a three-year period; thus, it came into existence in response to needs indicated by the faculty rather than the administration. The second unique feature was that, unlike many such centers of that day, its functions extended beyond routine provisions of audiovisual services to an underlying goal of improving campus instruction." (p.67)

During the late 1950s colleges and universities were facing the challenges of increased enrollment. Davis et al., (1976) wrote:

Foremost among the changes at MSU were the dramatic and impressive increases in the size and nature of the student body. At the close of World War II, Michigan State was a relatively small institution. Twenty years later, it was one of the largest universities in the nation. In 1944, the total enrollment was approximately 5,500 students. Five years later, the figure had risen to 15,000. In 1955, the total enrollment was close to 17,200, and by 1960-61, it had increased approximately another third to 21,200. In 1965, it had spurted to 35,500; and the end was not in sight. (p.4)

But President John H. Hannah, at the time announced the enrollment target would be limited to 35,000 for 1972, in

contrast to the 48,000 that had been predicted. It was known growth in student body demands increased instructional services, facilities and resources. Davis et al., (1976) mention:

American universities have three traditional missions: (1) instruction, (2) research, and (3) service. Of these the Educational Development Program has been concerned primarily with the first, and all that the term instruction implies for curriculum and faculty development, instructional design, and evaluation of educational outcomes. (p.2)

In March 1961, Michigan State University committed itself to the establishment of a "seven point program" (see Presidents Hannah's State of the University address in Davis et al., 1976, pp.7-8) for the improvement of undergraduate education. One of the key points in that program called upon the university "to put to use discoveries already made concerning the learning process." Two years later in February, 1963, the Educational Development Program was established and in July of 1964, EDP received a three-year grant of \$440,000 from the Ford Foundation.

The Educational Development Program became essentially as a grant program for funding projects to improve instruction in the university. During the first few years of its operation, the EDP consisted of a directorate and three ancillary instructional development agencies: the Instructional Media Center (IMC), the Learning Service (LS), and the Evaluation Services (ES). The granting mechanism was separated from consultation and technical support to avoid the

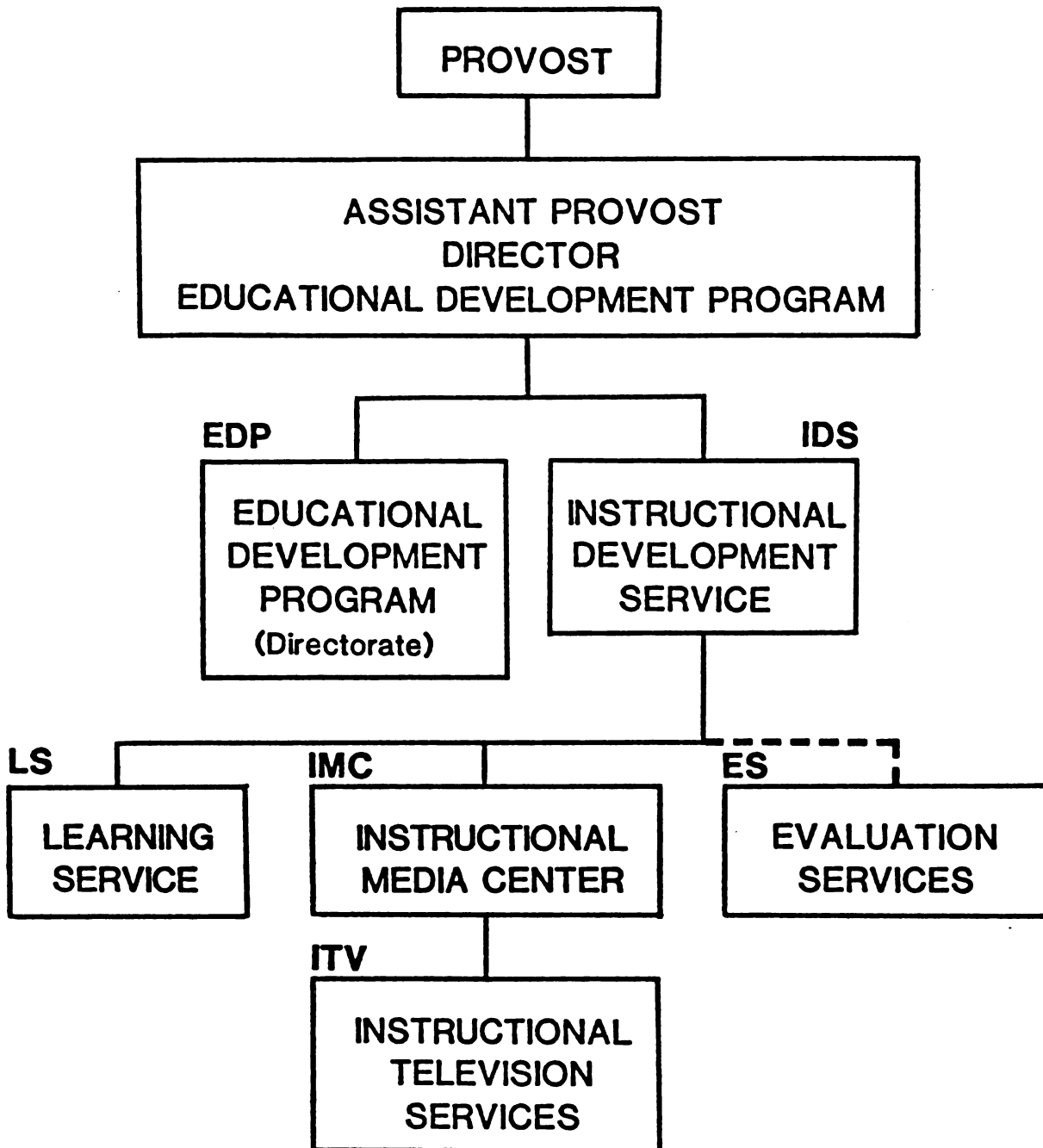


Figure 1. Organization of the Educational Development Program in 1965.

impression that grants were tied to the use of media. The organizational structure of the EDP in 1965 is presented in Figure 1. (Davis et al., 1976, p.15)

In order to improve the program, organizational framework shown in Figure 1 underwent some changes. Davis et al., (1976) point out that:

Four major organizational changes have occurred since the Educational Development Program began over a decade ago. Although the need for these changes was recognized as early as 1965, most of the changes actually took place in the mid-1970s. These changes included: (1) moving the professional educational technology consultants from the Instructional Media Center to the Learning Service; (2) amalgamating the Evaluation Services with the Learning Service and forming a new agency; (3) aligning the EDP Directorate into a relationship comparable to other instructional support agencies; and (4) integrating broadcast TV and radio into a new organization called the Instructional Development and Telecommunication Services. (p.18)

With these changes, at that point, closely tied to EDP, but less "publicly" visible was the Learning and Evaluation Services--an agency providing a wide range of instructional development, faculty development, and teaching evaluation services. The staff of the L&ES facilitate and support activities such as those funded by the EDP--in fact, many client faculty are unaware that the agency and the grants program are not combined. But the L&ES also provides services to scores of clients and projects beyond those supported by Educational Development Program funds.

The EDP and ID&TS have since the inception of the program up to 1979, worked closely with the faculty on hundreds

of individual projects. Abedor (1979), points out:

The Education Development Program (EDP) is a funding agency in the Provost's Office responsible for the improvement of educational opportunities offered to Michigan State University undergraduates. EDP provides seed money for faculty-initiated projects in all disciplines which give promise of improving both the quality and efficiency of undergraduate education. EDP supports experimentation and evaluation of new procedures and methods in learning and teaching and disseminates information about significant activities in educational research, development and evaluation.

The overall goal of the program is to facilitate development and implementation of innovative educational practices at Michigan State University which preserve and improve undergraduate education in the face of limited financial resources and an explosive increase in the amount and complexity of knowledge. (p.3)

The goals and objectives of the program have not changed since its inception and are aimed to preserve and improve undergraduate education. These goals as Abedor (1979) points out are:

1. To identify major problems in the areas of the curriculum, the learning/teaching process and the utilization of faculty, financial and physical resources.
2. To stimulate and conduct research which will suggest solutions to identified problems.
3. To undertake projects and studies which give promise of improving both the quality and efficiency of the undergraduate program.
4. To support and provide service to groups interested in experimentation with new procedures and methods in learning and teaching.
5. To facilitate implementation of faculty and administration-approved solutions to problems.
6. To identify and communicate progress in research, experimentation and implementation. (p.3)

Operations

The Educational Development program functions on a project base in much the same manner as other funding agencies. An operating budget from the university general budget is allocated to provide seed money for projects submitted by faculty members. Projects involve development, implementation and evaluation of some components of the undergraduate educational process, such as development of improved instructional procedures, analysis of curriculum, creating new courses and/or modification to existing courses or review of college/departmental operating procedures. Normally, a faculty member works with the EDP office and consultants from the Learning and Evaluation Service (L&ES) in the development of a proposal. After approval by the appropriate department chairman and college dean, the proposal is submitted to the EDP office for evaluation and review by a panel of faculty members.

After approval by EDP, the funds are transferred directly to the department or college. Projects are normally supported by EDP during their developmental or experimental phase or until sufficient data have been collected for objective assessment. Upon project completion, if evaluation is favorable, it is expected that the department or college will assume the costs of continuing the new course, curriculum or instructional procedures.

Project Proposals

If a project was to be eligible for EDP grant it must be evaluated against some specific criteria. Abedor (1979) mentions four criteria:

1. Number of students affected: EDP is especially concerned with those undergraduate courses and departments which serve the largest number of students.
2. Experimental or innovative approach: The project must evidence an experimental or innovative approach to curriculum and/or instruction. EDP does not seek to promulgate traditional procedures but instead seeks new and improved methods of solving instructional problems.
3. Generalizability: The techniques, procedures or materials developed must seem potentially applicable to other academic areas in the university.
4. Capability for evaluation: The project must be designed in such a way that outcomes can be evaluated. Procedures for evaluation are built into all projects and faculty are required to submit final reports describing project outcomes. (pp.4-5)

Previously there had been a fifth criterion, namely "approval by the college dean and department chairperson", which we can't see it addressed by Abedor, though, in his suggestions for preparing a proposal he mentions: "Endorsement (Cover Letter) by department chairman and college dean (to indicate that the dean and department chairman are aware of the proposal and firmly support the project development)". (p.6)

Up to the end of 1979, EDP was running smoothly at Michigan State University. In a study done by Davis (1978), he wrote:

The EDP budget for grants, and the L&ES budget

for salaries and operations, are about equal. During one interview, question was raised concerning which would be affected most if budget recisions were ordered. The response was that neither the EDP nor the L&ES would likely to be abandoned--both were felt to be "institutionalized." (p.24)

The program was not to be destined as such. Following the financial difficulties of 1980 and reorganizations of President Mackey, according to MSU News-Bulletin (second week of April, 1980), the organization structure of EDP was decentralized. EDP and IMC went under supervision of Associate Provost Kinsinger. Learning and Evaluation Services under Assistant Provost for General Academic Administration, and Instructional Television, Public Television, and Radio Broadcasting went under the control of Lifelong Education Programs. This reorganization was not the end. Following the unsettled economic conditions in summer of 1980 and subsequent budget cuts, the Educational Development Program was considered to be eliminated by July 1981. In this way one of the successful programs of the university is sacrificed as a result of financial difficulties.

1975

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
1. Agricultural-Engineering	Development of an instructional module in a videocassette for use in AE 92-- <u>Electrical Wiring II</u>	Mr. Richard Soderberg
2. Agricultural-Technology**	Development of mastery learning SLAT's for the Agricultural Technology Soil Science Program	Dr. Henry D. Foth Dr. Paul E. Rieke Mr. Terence H. Cooper
3. American Thought and Language*	Development and utilization of materials for a new interdisciplinary university college course <u>Sex and Sexuality in American Films</u>	Dr. Herbert Bergman
4. American Thought and Language	Production of two videotapes to indicate the philosophy, goals and teaching procedures in a course in American Radical Thought	Dr. David Wiener
5. Anxiety Reduction	Establishment of a behavior treatment program for the alleviation of speech and test anxiety	Dr. David C. Ralph Dr. Richard K. Russell
6. Art and the Humanities	Revision of slide-tape units for art lessons in Humanities 201, 202 and 203	Dr. Roy T. Matthews
7. Chemistry**	Continued development of a modular multipath general chemistry program	Dr. Robert N. Hammer
8. Computer Science	Continued development of a self-paced instructional system in basic computer programming	Dr. Floyd E. Lecureux
9. Computer Science**	Development of a system to provide individual, on-call, computer-generated examinations in combinational logic and switching circuits	Dr. Richard J. Reid

*Projects randomly selected

**Projects actually used in the study (from the sample)

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
10. Education: Research and Evaluation Training	Implementation of the FEHR Practicum computerized simulation to provide research and evaluation training for Michigan State University faculty and students	Dr. Norman T. Bell
11. Engineering	Development of a student assisted mode of instruction for <u>Engineering Communications</u> (EGR 160)	Dr. Floyd E. Lecureux
12. English	Development of new courses in American popular culture	Russel B. Nye James H. Pickering Larry N. Landrum
13. Faculty Development	Production of instructional materials for faculty development	Dr. Lawrence T. Alexander
14. Faculty workshop: GRADER	Faculty workshops on a computer program to record test scores and evaluate student performance	Dr. Leighton A. Price
15. Food Science and Human Nutrition**	Development of a prototype SLATE for teaching students to identify retail and institutional cuts of beef and to state appropriate culinary procedures for each	Dr. James F. Price
16. Geology	Development of SLATE's for Geology 201	Dr. Sam B. Upchurch
17. German	Continued development of audio-visual materials to improve instruction in undergraduate German courses	Dr. Udo A. Munnich
18. Human Ecology	Development of a modularized core program in Human Ecology	Ms. Jean R. Page
19. Humanities**	Continued development of AV modules on the People's Republic of China	Dr. Joseph J. Lee
20. Humanities	Continued development of reading comprehension AV modules based on the subject assignments in Humanities courses	Dr. F.D. Barrows assisted by Ms. Elaine E. Cherney

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
21. Innovation in College Instruction	Presentation of a program on innovations in College Instruction	Dr. Lawrence T Alexander
22. Interdisciplinary course**	Development of an interdisciplinary course, <u>The Role of the Helping Professions in Community Services</u>	Dr. Pearl J. Aldrich Professor John S. Duley
23. Interpersonal Process Recall (IPR)	Continuation of a test of the feasibility of large scale implementation of IPR training in dormitories on the MSU campus	Dr. Norman Kagan Dr. J. Bruce Burke
24. Mathematics	Development of instructional modules for use in Math 081 and 082	Ms. Elizabeth Phillips
25. Psychology	Evaluation of procedures for improving creative thinking in Psychology classes	Dr. Donald M. Johnson
26. Public Speaking**	Development of a 100 level general service course in Public Speaking entitled <u>Studies in Public Communication</u>	Dr. David C. Ralph Dr. Gordon L. Thomas
27. Russian*	Development of a programmed audio workbook for teaching listening comprehension of Russian	Dr. Frank L. Ingram
28. Social Work	Revision of slide-tape self-instruction units designed to replace field trips in introducing students to social services and community agencies	Dr. Clayton T Shorkey
29. Sociology	Development of a training program for graduate teaching assistants	Dr. William L. Ewens
30. University College-Faculty Workshop	The conduct of a two-day workshop for University College faculty on the improvements of instruction	Dr. Leroy A. Olson
31. Zoology**	Revision of laboratory portion of <u>Fundamentals of Invertebrate Zoology</u> (ZOL 381)	Dr. Ralph A. Pax

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
32. Behavior Science Instructional Laboratory(BSIL)	Development of a laboratory and instructional materials to facilitate using computers to augment undergraduate social science research courses	Dr. Leighton A. Price Mr. Melvin J. Katz
33. Clinical Medicine	Development of patient game simulations for instructing medical students of the Colleges of Human and Osteopathic medicine in clinical skills	Professor John Duley
35. Human Medicine	Development of workshops to improve small-group teaching in the College of Human Medicine	Dr. J. Dennis Hoban Dr. R. Dale Lefever
36. Interdisciplinary Curriculum in pest management	Development of a coordinate interdisciplinary curriculum involving departments of Horticulture, Crop and Soil Science, Entomology, Botany and Plant Pathology, Fisheries and Wildlife and Agricultural Economics to produce a specialization in Pest Management for plant protection	Dr. Charles W. Laughlin Dr. George S. Ayers
37. Medical Education	Development of procedures and materials for training medical students in patient diagnosis and treatment	Dr. Arthur S. Elstein
38. Orientation of New Faculty	Development of a program for acquainting new faculty with the Instructional Development and Telecommunication Services	Dr. James L. Page
39. Osteopathic Medicine	Development of a portion of the Undergraduate Curriculum in Systems Biology I-IV	Dr. Fred C. Timming Dr. J. Warren Anderson Dr. Sarah A. Sprafka
40. Osteopathic Medicine	Improvement of planning, teaching and evaluation in a Psychomotor skills training sequence concerning Osteopathic manipulative therapy	Dr. Sarah A. Sprafka Dr. John P. Casbergue

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
41. Undergraduate Lifelong Education Via Computer Managed, Interactive TV	A feasibility study involving development of an undergraduate course in educational psychology using a computer-managed interactive cable TV system	Dr. Erling Jorgensen

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<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
1. Agricultural Technology	Continued development of mastery learning SLATE's for the Agricultural Technology Soil Science program	Dr. Henry D. Foth Dr. Paul E. Rieke Mr. Terence H. Cooper
2. Animal Husbandary**	Development of SLATE's for IDC 488-- <u>The Impact of Animal Resource Management upon the World's Developing Nations</u>	Dr. Robert J. Deans
3. Civil Engineering Structural Analysis	Development of self-paced mastery model course with computer-generated exams for CE305- <u>Structural Mechanics I</u>	Dr. James L Lubkin
4. Computer Assisted Graphic Design	The development of an interdisciplinary program in Computer Assisted Graphic Design	Professor Joseph J. Kuszai
5. Computer Science	Development of individualized problem sets for CPS 110-Intro to Computer Programming for Engineers and Scientists	Dr. Floyd E. LeCureux
6. Crop and Soil Science**	Development of a laboratory manual for grain grading	Dr. Lawrence O. Copeland
7. Electron Microscopy*	Development of SLATE's and videotapes to facilitate the teaching of Electron Microscopy	Dr. Gary R Hooper
8. Engineering	Development of a graphic communications slide presentation and self-teaching module	Dr. Robert A. Bullock

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
9. Engineering	Implementation, evaluation and dissemination of technologically-oriented instructional games (TOIGS) for use in IDC 201-Intro to Environmental Systems	Dr. Ronald C. Rosenberg Dr. Frederick T. Fink
10. English as a Second Language	Revision of audio tape recordings for teaching English as a second language	Ms. Wuyi So
11. Faculty Development	Publication of <u>Learning Service Teaching Hints</u>	Dr. Stephen L. Yelon
12. Fisheries and Wildlife**	Development of a SLATE for FW 426- <u>Ecology of Migratory Birds</u>	Dr. Harold H. Prince
13. Food Science and Human Nutrition	Continued development of SLATE's for teaching students to identify retail and institutional cuts of beef and to state appropriate culinary procedures for each	Dr. James F. Price
14. Food Science and Human Nutrition**	Development of alternate laboratory instructional methods for NHF100- <u>Elementary Food Preparation</u>	Dr. Grace A. Miller
15. GRADER	Development of a training program for GRADER	Dr. LeRoy A. Olson
16. GRADER	Evaluation, continued development and efforts to implement a university-wide service to record test scores in large enrollments	Dr. Leighton A. Price
17. Horticulture	Development of an AV tutorial program for HRT 221 and 222--Landscape Plants I and II	Dr. Ronald L. Spangler
18. Human Ecology**	Continued development of a modularized core program in Human Ecology	Ms. Jean R. Page
— 19. Humanities	Completion of the development of AV modules on the People's Republic of China	Dr. Joseph J. Lee

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
20. Humanities**	Development of a TV course to be offered for credit as a part of the universities program in life-long education	Dr. Karl F. Thompson
21. Instructional Television	Evaluation of Michigan State University's cable TV Instructional Program for students living in Married Housing	Dr. Erling S. Jorgenson
22. Instructional Television	Purchase of Computer ITV interface equipment to transmit visually over cable TV test questions generated by computer	Dr. Erling S. Jorgenson
23. Instructional Television	Survey of attitudes toward the concept, "Credit by TV"	Dr. John D. Simpkins
24. Interdisciplinary Course	Continued development of an interdisciplinary course, <u>IDS 221-The Role of the Helping Professions in the Community</u>	Dr. Pearl J. Aldrich Prof. J.S. Duley
25. Journalism*	Development of new teaching and testing materials for courses in Journalism	Dr. George A. Hough, III
26. Natural Science**	Development of a series of SLATE's for teaching technical and scientific vocabulary for Natural Science 181, 182, and 183	Dr. Robert L. Bradley
27. Pest Management	Development of SLATE's for teaching Weed and Economic Insect Identification	Dr. George S. Ayers
28. Physics	Development of a peer-assisted, mastery learning instructional model for <u>PHY 238-Intro to Physics</u>	Mr. M.K. Azima
29. Political Science*	Production of slides of political cartoons for PLS 430- <u>Seminar in Political Organization and Behavior</u>	Dr. Charles Press
30. Psychology	Development of peer-assisted learning (PAL) procedures and materials for <u>PSY 170-Intro to Psychology:General</u> and <u>PSY 406-Psyco-Ethology</u>	Dr. Stanley C. Ratner

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
31. Student Counseling**	Development of audio tape recordings for educational-vocational counseling	Ms. Camille D. Smith
32. Zoology	Revision of microfiche cards for ZOL 381- <u>Fundamentals of Invertebrate Zoology</u>	Dr. Ralph A. Pax
33. Agriculture and Natural Resources	Development of a teaching facility and study of the influence of teaching facilities on educational productivity	Dr. David L. Armstrong
34. Faculty Development	Development of a teaching model, a workshop program and support materials for teaching instructors to teach Psychomotor skills	Dr. John P. Casbergue Dr. Stephen L. Yelon
35. Medical and Nursing Education	Development of facilities, materials and operational procedures for training Medical and Nursing students in Clinical, Diagnostic and Patient Management Skills	Dr. Jack L. Maatsch Dr. F.G. Tinning Dr. Robert M. Dougherty Ms. Nancy A. Hendershot Dr. J.D. Hoban
36. Medical Education	Development of paper and pencil Clinical Simulations to be used for student evaluation in the College of Human Medicine	Dr. J. Thomas Parmeter
37. Medical Education	Improvement of planning, teaching and evaluation in a Psychomotor skills training sequence concerning Osteopathic Manipulative Therapy	Dr. John P. Casbergue Dr. Sarah A. Sprafka
38. Nursing	Use of television to provide off-campus instruction	Professor Sandra J. Simmons

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<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
1. Advertising	Development of a transactional learning system for ADV 205- <u>Introduction to Advertising</u>	Drs. Charles R. Mauldin & David H. Furse

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
2. Chemistry	Identification of learning problems and development of remedial instructional modules for CEM 130, 131- <u>Intro to Chemistry I and II</u>	Dr. Robert N. Hammer
3. Computer Science	Development and preliminary evaluation of a section using interactive computing rather than batch processing in a regular structured course environment	Dr. Harry G. Hedges
4. Computer Science*	Development of a decision table processor to facilitate instruction in problem solving concepts in CPS 110- <u>Intro to Computer Programming</u>	Dr. Herman D. Hughes
-5. Crop and Soil Science	Development of visual materials to supplement laboratory manual for grain grading	Dr. Lawrence O. Copeland
6. Dairy Science	Development of 13 SLATE's for use as prep labs in Dairy Science (DRY) 214- <u>Dairy Production</u>	Dr. Patricia A. Nodan
7. Educational Television	Development of materials for use in testing the TV version of HNF 102- <u>Nutrition of Man</u>	Dr. Dena C. Cederquist
8. Engineering**	Continued development and evaluation of technologically-oriented instructional games (TOIG) for use in IDS 201- <u>Intro to Environmental Systems</u>	Dr. Ronald C. Rosenberg Dr. Fredrick T. Fink
9. Engineering	Development of self-paced instructional modules for EGR 160- <u>Engineering Communications</u>	Dr. F.E. LeGureux
10. English as a Second Language	Continued development of audio-tape recordings for teaching English as a second language	Ms. Wu Yi So
11. English: Scientific Writing*	Development of a year-long sequence of English courses in Scientific Writing	Dr. E. Fred Carlisle

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
12. Expansion of Non-print Facilities in the Library	Installation of 3 video-cassette/ITV viewing stations in the MSU library to enable students to view videotapes and closed circuit telecasts of course instruction	Dr. Richard E. Chapin Dr. Erling S. Jorgenson
13. Faculty Development	Development of a profile of the characteristics of EDP project directors and their departments	Dr. Allan J. Abedor Mr. Steven G. Sachs
14. Faculty Development	Development and Conduct of a Microteaching workshop for MSU Faculty	Dr. Lawrence T. Alexander
15. Faculty Development	Procurement of materials for use in SLATE workshop for faculty	Dr. Lawrence T. Alexander
16. Faculty Development	Replacement of electronic equipment in the experimental classroom facility	Dr. Lawrence T. Alexander
17. Fisheries and Wildlife	Continued development of SLATE's for FW 426- <u>Ecology of Migratory Birds</u>	Dr. Harold H. Prince
18. Food Science and Human Nutrition**	Development of computer programs for courses in Human Nutrition and Foods	Dr. James R. Burnett Ms. Gatha A. Williams
19. The Helping Professions in Community Services	Continued development of UMS 221- <u>The Role of the Helping Professions in Community Services</u>	Dr. Patricia Barnes McConnell
20. Human Ecology	Continued development of a modularized core program in Human Ecology	Ms. Jean R. Page
21. Humanities**	Development of AV materials for a new course, HUM 345- <u>Jewish Humanities in the Twentieth Century</u>	Dr. Anthony Linick
22. Humanities	Production of 2x2 slides of Japanese art and social history for use in HUM 293- <u>The Cultural Traditions of Japan</u>	Dr. R. Craig Philips

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
23. Instructional Television	Investigation of attitudes toward ITV courses offered on CATV	Dr. Erling S. Jorgensen
24. Instructional Television Library	Investigation of procedures and cost using off-the-air recordings on the MSU Closed Circuit television system and to recommend policies governing the procurement and use of these materials	Dr. Erling S. Jorgensen
25. Interdisciplinary Humanities Course**	Development of an interdisciplinary course entitled: <u>Critique of a Bourgeois Culture</u>	Drs. Duggan, Konvitz, Johnsen, Goodson, Watkins and Koppisch
26. Journalism	Development of a competency based curriculum in Journalism	Dr. George A. Hough, III
27. Microbiology**	Development of a mastery instruction model for MPH 301- <u>Intro to Microbiology</u>	Dr. Charles L. SanClemente
— 28. Natural Science	Testing of an interactive computer assisted instructional model in Natural Science courses; and development of a computer assisted mathematics remediation program	Dr. Donald J. Weinshank
29. Pathology Computer Science	Development and feasibility testing of a computerized materials and information integration program	Dr. John F. Dunkel Dr. Joan C. Mattson Dr. M. Glenn Keeney
30. Pest Management	Development of simulation/gaming materials for practicing problem solving in Pest Management	Dr. George S. Ayers
31. Physics	Continued development of a peer-assisted, mastery-learning instructional model for PHY 238--Intro to Physics	Mr. M.K. Azima
32. Physics**	Evaluation of a self-paced mode of instruction in 12 upper-division Physics courses	Dr. Julius S. Kovacs

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
33. Plant Pathology**	Development of SLATE's for teaching Plant Pathology and Plant disease identification	Dr. Joseph M. Vargas, Jr.
34. Political Science	Evaluation of student experiences in PLS 494- <u>Field Work in Political Science</u>	Dr. Leroy C. Ferguson Mr. David Winder
35. Psychology	Production of audiotapes and written text for PSY 336- <u>Psychology of Social Movements</u> and PSY 437- <u>Psychology of Political Behavior</u>	Dr. Charles F. Wrigley
36. Social Studies Education	Development of instructional procedures and materials for Law-focused education for use in ED 325D- <u>Teaching of Social Studies in Elementary Grades</u>	Dr. William W. Joyce
37. Sociology	Development of a televised version of SOC 241- <u>Intro to Sociology</u>	Dr. Philip M. Marcus
38. Special Education**	Development of videotapes for instruction and student evaluation in STA 423- <u>Art in Special Education</u>	Dr. Charles S. Steele
39. Advertising Media	Development of a computer simulated media buying game	Dr. Martin P. Block Dr. Don E. Schultz
40. BioChemistry	The use of closed-circuit TV and videotapes in teaching BCH 401- <u>Basic BioChemistry</u>	Dr. Loran L. Bieber Dr. J.L. Fairley
41. Clinical Problem Solving Sessions	Development of small group Clinical Problem Solving Sessions for second-year students at College of Osteopathic Medicine	Robert Ward, D.O. George Bordage, M.D. Ruth LeZotte, Ph.D.
42. Faculty Development	A workshop program on preparing faculty to work together in facilitating small groups	Dr. John P. Casbergue Lyn Farquhar
43. Human Medicine	Development patient simulation games for use in continuing Medical Education	Dr. Jack Maatsch

<u>Title</u>	<u>Project Summary</u>	<u>Project Director</u>
44. Human Nutrition and Foods	Planning and construction of a dietetic instructional media laboratory	Dr. Gilbert A. Leveille

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<u>Title</u>	<u>Project Summary</u>	<u>Project Director</u>
1. Advertising	Development of a transactional learning system for ADV 205: Intro to Advertising (Second Year)	Dr. Charles R. Mauldin Dr. David H. Furse
2. Agricultural and Natural Resources Education Institute	Assignment and redesign of Agriculture and Natural Resources Communications(AG401)	Dr. Maxine S. Ferris
3. Art Education and Special Education	Development of expressive materials for teacher training in the main streamed classroom, STA 302: <u>Art in Special Education</u>	Dr. Charles S. Steele
4. Art History**	Design and develop a new painting and drawing course emphasizing techniques used prior to the 20th Century	Dr. Eldon N. VanLiere
5. Botany and Plant Pathology	Development of SLATE programs for teaching Plant Pathology and Plant disease identification	Dr. J.M. Vargas, Jr. Dr. George S. Ayers
6. Communication**	Development of a set of videotapes to complement and supplement course instruction in Communication 100	Dr. Cassandral L. Book
7. Computer Science	Continuation, expansion and evaluation of a project using interactive computing rather than batch processing in a regular structured course	Dr. Harry G. Hedges

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
8. Computer Science	Development of a decision table processor to facilitate instruction in problem solving concepts in CPS 110- <u>Intro to Computer Programming</u>	Dr. Herman D. Hughes
9. Criminal Justice**	Development of a model program for integrating curriculum design with the employment market	Dr. John K. Hudzik
10. Crop and Soil Science	Development of visual materials to supplement lab manual for grain grading	Dr. Lawrence O. Copeland
11. Dairy Science**	Development of a series of slide/tape autotutorial units (SLATE's) for a laboratory in mammary physiology	Dr. H. Allen Tucker Mr. Duane Kalin
12. Dairy Science	Continued development of self-instructional modules for Dairy Production (DRY) 214)	Dr. Roy S. Emery
13. Development Psychology**	The development of instructional resources and graduate assistant teacher training for PSY 244: <u>Developmental Psychology: Infancy-Childhood</u>	Dr. Hiram E. Fitzgerald
14. Effective Learning and Study Skills	Development of self-instructional modules and instructor materials to improve learning and study skills	Ms. Colleen Cooper Ms. Ann Sullivan Ms. Judy Shulman
15. English as a 2nd Language	Developing competency-based and individualized models for advanced students at the English Language Center	Dr. Paul E. Munsell Dr. Ralph P. Berrett Mr. M. Kiavash Azima
16. English: Scientific Writing	Development of a year-long sequence of English courses in Scientific Writing	Dr. E. Fred Carlisle
17. Entomology, Center for Electronoptics	Develop a system for direct videotape recording from scanning electron microscopes and use the system in developing teaching materials	Dr. Gary R. Hooper

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
18. Experimental Psychology	Procurement of educational materials for PSY 403- <u>Experimental Psychology:Human Learning</u>	Dr. M. Ray Denny
19. Faculty and Instructional Development	Development of a departmental approach to the improvement of instruction	Dr. Lawrence T. Alexander Dr. Steven G. Sachs
20. Food Science and Human Nutrition	Refinement and evaluation of SLATE's for teaching students to identify a variety of meat cuts and to state appropriate culinary procedures for each	Dr. James F. Price
— 21. Geology, Zoology, Entomology	Use of a microscope TV camera and color monitor for teaching microscope concepts to large groups	Dr. F.W. Cambray
22. Health, Physical Education and Recreation	Development of a new curriculum in athletic coaching using high-speed films	Dr. Gale Mikles
23. Human Environment and Design	Revision of HED 152: <u>Principles of Clothing Construction</u>	Ms. Ila Pokornowski Ms. Marlene Wamhoff
24. Humanities**	Development of a course which allowed students to structure their own learning experience	Dr. Margaret W. Grimes
25. Humanities	Production of 2x2 slides of Japanese art and social history for use in HUM 293- <u>The Cultural Traditions of Japan</u>	Dr. R. Craig Philips
26. Humanities	The development of a core-satellite course dealing with the roles and contributions of women in the Humanities	Dr. Jane Karoline Vieth
27. Instructional Modules for Applied Physics**	Development of self-instructional competency-based learning modules on topics to service upper-division non-physics majors	Dr. Peter Signell
28. Interdisciplinary Humanities course	Development of an Interdisciplinary course entitled: <u>Critique of a Bourgeois Culture</u>	Drs. Duggan, Goodson, Johnson, Konvitz, Kippisch, Watkins and Wilkinson

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
29. Journalism	Development of a competency based curriculum in Journalism	Dr. George A. Hough III
30. Management	The development of video-taped materials to be used in the classroom	Dr. Henry Tosi
31. Mathematics	A study of students thinking procession in solving infinite process problems to provide a basis for curricular revisions in MTH 424	Dr. John J. Masterson
32. Natural Science**	Production of slide/tape supplements to the basic Natural Science Courses to aid the under-prepared (skills deficient) freshman with this general education requirement	Dr. Manfred D. Engelmann Dr. Charles St. Clair
33. Natural Science	Use of computer-assisted instruction for mathematics remediation in the basic Natural Science series: NS 181, 182, 183	Dr. Donald J. Weinshank
34. Pest Management	Development of 3 computer-based simulation games for learning ecosystem problem solving and decision making in Pest Management	Dr. George S. Ayers
35. Plant Physiology	Development of pre-lab self-instructional slide/tape modules for Intro to Plant Physiology (BOT 301)	Dr. Kenneth Nadler
36. Political Science	Evaluation of student experiences in <u>PLS 494-Field Work in Political Science</u>	Dr. Leroy C. Ferguson Mr. David Winder
37. Political Science and International Relations	Programming and instructional materials for the <u>Inter-Nation Simulation</u> for use in <u>Political Science 160</u>	Dr. William H. Baugh
38. Psychology	Teaching the <u>Psychotherapy of Psychosis</u> by means of video-taped interviews	Dr. Bertram P. Karon

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
39. Social Science	Development of slide/tape presentations to augment instruction in Social Science 221, 222, and 223	Dr. Douglas Dunham
40. Sociology	Development of a televised version of SOC 241- <u>Intro to Sociology</u>	Dr. Philip M. Marcus
42. Telecommunications*	Development of a "turn-key" strategy and self-contained instructional modules for a telecommunication course for non-majors	Dr. Thomas A. Muth
43. Videocassette/ IPTV Viewing Stations	A study of procedures for reducing maintenance costs for IPTV viewing stations in the MSU Library	Dr. Richard Chapin Dr. Erling Jorgensen Dr. Kent Creswell
44. Zoology	Evaluate the success of a new laboratory course in changing student attitudes and skills	Dr. Richard W. Hill Dr. Donald L. Beaver
45. Osteopathic Medicine	Development of a program to train primary care physicians to assume teaching roles in classroom and out-patient settings	Dr. Norman T. Bell Dr. Perrin E. Parkhurst Dr. Fred C. Tinning

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<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
1. Audiology and Speech Science	Classroom and laboratory demonstration of selected auditory phenomena for students of communication disorders	Dr. Michael R. Chial Dr. Linda L. Smith Dr. Steven C. White
2. BioChemistry	Development of "compressed" audiotapes in lecture courses	Dr. J.E. Wilson
3. Biological Science 202**	Development of a three-part approach to course improvement	Dr. N. Jean Enochs

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
4. Botany and Plant Pathology	Development of self-instructional and other materials for use in Botany 053	Dr. Willard M. Rose Dr. Fred H. Tschirley
5. Botany and Plant Pathology	Continued development of self-instructional audiovisual modules for Botany 051	Dr. Kenneth Nadler
6. Civil Engineering**	Computer-assisted test and homework construction for problem-type courses	Dr. James L. Lubkin
7. Communication	Continued development of videotapes and a new instructional model integrating the videotapes in Communication 100	Dr. Cassandra Book
8. Competency Assessment	Planning academic assessment and advising centers for life-long education students	Mary Jim Josephs
9. Educational Psychology	Development of decision criteria for the selection of in-class and out-of-class and instructional formats	Dr. Jed Lewis
10. Energy: A Thematic Program**	Development of an undergraduate Thematic program in Energy and Related Issues	Dr. James J. Gallagher Dr. Herman Koinig
11. English as a 2nd Language	Developing competency-based and individualized learning modules for advanced students at the English Language Center	Dr. Pat Barrett Dr. Paul Munsell Ms. Carol Becka
12. English: Scientific Writing	Evaluation of a year-long sequence of English courses emphasizing Scientific Writing	Dr. E. Fred Carlisle
13. Evaluation	A pictorial stimulus-oriented approach to testing performance skills	Dr. James R. Nord
14. Evaluation	Diagnostic verbal item analysis	Dr. LeRoy Olson
15. Evaluation	Criterion-referenced mastery model item analysis program	Dr. LeRoy Olson
16. Faculty Development	Development of an instructional media production lab for faculty	Mr. S. Chatterje

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
17. Food Science and Human Nutrition	Revision of modules for self-instructional labs in food preparation	Dr. Rose M. Tindall
18. Fortran Programming	Further development of modularized FORTRAN programming course	Dr. Floyd LeCureux Mr. James Nash
19. History	Development of a course on the history of sports in America	Dr. Peter Levine
20. Human Environment and Design	Revision of HED 152: <u>Principles of Clothing Construction</u>	Ms. Ila Pokornowski Ms. Marlene Wanhoff
21. Humanities	Development of course materials for a "Satellite" course concerning medicine in Humanities	Dr. B.N. Pipes
22. Humanities	Development and integration of live musical performances and demonstrations into the humanities curriculum	Dr. Conrad L. Donakowaski
~23. Humanities**	Development of an experimental mastery model in the humanities involving self-paced modules, tutors and seminars	Dr. Floyd Barrows Dr. Elaine Cherney
24. Humanities	Improvement in the quality and color fidelity of the Dept. of Humanities art slides	Dr. R. Craig Philips
25. Interdisciplinary course Development	Development of an interdisciplinary course entitled <u>Critique of a Bourgeois Culture</u>	Dr.. Josef Kovvitz, History Dr. David Loromer, History Dr. William Johnsen, English Dr. Victor Parnenen, English Dr. Malcolm Compitello Romance and Classical Language Dr. Linda Stanford, Art Dr. Richard Peterson, Philosophy Dr. Winston Wilkinson, Philosophy

<u>Title</u>	<u>Project Summary</u>	<u>Project Directors</u>
26. Journalism	Continued development of a computer-assisted and competency-based instructional program in Journalism	Dr. George A. Hough III
27. Learning and Evaluation Service	Development of a Departmental Instructional Profile	Dr. Steven B. Sachs
28. Management	Development of videotaped lectures for Management 302	Dr. Henry Tosi
29. Mathematics**	Development of materials and course procedures to assess the effect of hand-held calculators on student learning and motivation in Mathematics 108 and 109	Dr. Marshall Hestenes Dr. R. O. Hill, Jr. Ms. Elizabeth Phillips
30. Mechanical Engineering	Development of a mastery model instructional component for Mechanical Engineering 352	Dr. Ronald Rosenberg Dr. Albert Andry
31. Microbiology	Development of a mastery instructional model for <u>Intro to Microbiology</u> (MPH 301 and 302)	Dr. Charles SanClemente
- 32. Natural Science**	Feasibility test of the Sony Betamax system to determine whether such use of video modules on a decentralized basis will result in more flexible scheduling, more faculty use and improved student learning	Dr. Alwynelles Ahl Dr. Helen B. Hiscoe Dr. Donald J. Weinshank
33. Psychology	Identification and Longitudinal study of highly competent, normal and problem undergraduates	Dr. Gary E. Stollak Dr. Eileen Thompson Dr. John Hurley Dr. Elaine Donelson
34. Sociology**	Use of films to integrate cross-cultural topics in Sociology	Dr. Bo Anderson
35. Statistics and Probability**	The use of filmed presentations to illustrate basic statistical phenomena	Dr. Raoul LePage

APPENDIX B

THE QUESTIONNAIRE FOR MEASURING PERCEIVED ATTRIBUTES OF AN EDP PROJECT

QUESTIONNAIRE FOR MEASURING
PERCEIVED ATTRIBUTES OF AN EDP PROJECT

Directions: For each of the following items, please indicate your level of agreement (or disagreement) by circling one of the five indicators. In all cases, SA means strongly agree, A means agree, N means neutral, D means disagree, and SD means strongly disagree. (Please note the terms "the project", "EDP project", "this project", "my project" and "innovation" refer to the EDP project mentioned in the attached letter.)

- If you: Strongly Agree, circle SA..... **(SA)** A N D SD
 Agree, circle A.....SA **(A)** N D SD
 are Neutral, circle N.....SA A **(N)** D SD
 Disagree, circle D.....SA A N **(D)** SD
 Strongly Disagree, circle SD.....SA A N D **(SD)**
1. Use of this project by others will
not require any special skill.....SA A N D SD
 2. As a result of the project, other
faculty have inquired about EDP grants..SA A N D SD
 3. I think the project is open to change
in its goals and procedures as circum-
stances change.....SA A N D SD
 4. My personal view regarding use of this
project is that the students benefit
more from it than what it replaced.....SA A N D SD
 5. I think my EDP project makes available
more diverse instructional materials
than before.....SA A N D SD
 6. This project is quite different from
other ideas and programs tried in
our department.....SA A N D SD
 7. You have to see my project in operation
in order to understand it.....SA A N D SD
 8. The outcomes of the project meet
recognized needs of the department.....SA A N D SD
 9. I think inconveniences brought about
by this project were greater than
the advantages.....SA A N D SD

Continue on page 2

10. Compared to conventional procedures,
more preparation is needed to use
this innovation.....SA A N D SD
11. The students praise this project for
the relevancy of its components to
their needs.....SA A N D SD
12. Students ratings of teaching pro-
cedures in this project are superior
to past ratings.....SA A N D SD
13. The project is positively perceived by
the majority of the departmental staff.SA A N D SD
14. There is an inadequate fit between
the project and the departmental
structure.....SA A N D SD
15. After this innovation was used in the
department some of the faculty members
tried to use similar procedures.....SA A N D SD
16. I think the project is an improvement
on past ideas or conditions that it
replaced.....SA A N D SD
17. My official assignments left me with
insufficient time to try out my
project.....SA A N D SD
18. Project outcomes provide a gain in
time and energy in helping me run
my course.....SA A N D SD
19. In general, my department may be char-
acterized as exhibiting eagerness to
seek out new ideas.....SA A N D SD
20. Since we began using this project my
students' attitude toward it has been
enthusiastic.....SA A N D SD
21. The likelihood of implementing projects
like this would be significantly en-
hanced with EDP support.....SA A N D SD
22. The requirement of extra materials and
equipment make operation of the innova-
tion more difficult.....SA A N D SD

Continue on page 3

23. This department gives the faculty some financial support for educational expenses related to the adoption of innovations.....SA A N D SD
24. Our department provides released time for staff to use similar projects on a limited basis.....SA A N D SD
25. The usefulness of the project was recognized by those involved, during the initial trial period.....SA A N D SD
26. The project outcome(s) need(s) to be revised to reduce complexity.....SA A N D SD
27. There are not institutional barriers preventing experimentation with my project.....SA A N D SD
28. Adopting the EDP project outcomes required substantial changes in the departmental procedures.....SA A N D SD
29. Faculty unfamiliar with the project would require special training in order to do it.....SA A N D SD
30. The college administrators strongly support change efforts of individuals in our department.....SA A N D SD
31. If I had a chance to do comparable work in another department, I would consider following the same procedures used in this project.....SA A N D SD
32. My department permits the use of small numbers of students for prototype testing purposes.....SA A N D SD
33. After weighing possible advantages and disadvantages of the EDP project, I am willing to be involved in another such project.....SA A N D SD
34. Tallies and records of materials and/or equipment used are available as visible indicators of the use of the project.....SA A N D SD

Continue on page 4

35. I think the project increases the economic use of human and material resources.....SA A N D SD
36. My EDP project represents an improvement in educational practice in my department.....SA A N D SD
37. Implementing projects like this in any college at MSU could constitute an improvement in its educational practice..SA A N D SD

In this part of the questionnaire please make a check-mark (✓) in the appropriate space, for each item below.

38. How long has the project outcome(s) been in use in the department?

Less than one year() 1 to 2 years() 2 to 3 years() 3 to 4 years() 4 to 5 years() 5 & up years()

39. Have there been any drastic changes in the project during this period?

Yes() No()

40. Generally, is the project continuing as initially planned?

Yes() No()

41. Is the project discontinued?

Yes() No()

42. In case your project has been discontinued, please indicate major causes briefly.

ITEMS WITH REVERSE SCALE

Relative advantage

A-5

Compatibility

B-3

B-4

Trialability

C-3

Complexity

D-1

RANDOME SELECTION OF ITEMS
FOR FINAL QUESTIONNAIRE

1. A-7	13. B-3	25. C-4
2. E-2	14. B-2	26. D-3
3. A-8	15. E-1	27. C-5
4. A-5	16. A-1	28. D-4
5. A-6	17. C-2	29. D-2
6. B-4	18. A-2	30. B-7
7. D-1	19. B-6	31. F-5
8. B-1	20. B-8	32. C-1
9. E-4	21. F-1	33. F-2
10. D-6	22. D-5	34. E-5
11. E-3	23. B-5	35. A-4
12. A-3	24. C-3	36. F-3
		37. F-4

APPENDIX C

ATTRIBUTES OF INNOVATIONS AND THEIR SUBDIMENSIONS

ATTRIBUTES OF INNOVATIONS
AND THEIR SUBATTRIBUTES*

A) Perceived relative advantage: The degree to which an innovation is perceived as being better than the idea it supersedes

Subattributes:

1. The innovation is an improvement on past idea or conditions. (Rogers & Shoemaker, 1971; Turnbull et al., 1974; Holloway, 1975; Hull & Kester, 1974; Chin, 1974)
2. The innovation brings about more student satisfaction. (Rogers & Shoemaker, 1971; Wolf & Fiorino, 1973; Holloway, 1975)
3. More economic uses of resources is apparent. (Havelock, et al., 1971; Huberman, 1973; Zaltman, et al., 1977; Hull & Kester, 1974; Rogers & Shoemaker, 1971; Pincus, 1974)
4. The adopting unit risks relatively little through participation and there is evident social prestige gained by having the innovation. (Rogers & Shoemaker, 1971; Havelock, et al., 1971; Zaltman, et al., 1977; Pincus, 1974; Chin, 1974; Holloway, 1975)
5. The initial trial cost of the innovation is low, there is a decrease in discomfort and immediacy of reward. (Rogers & Shoemaker, 1971; Havelock, et al., 1971; Huberman, 1973; Wolf & Fiorino, 1973, Turnbull, et al., 1974; Zaltman, et al., 1977; Chin, 1974)
6. The innovation is open to revision and change as circumstances require. (Rogers & Shoemaker, 1971; Chin, 1974; Havelock et al., 1971; Diamond et al., 1975; Wolf & Fiorino, 1973; Zaltman et al., 1977)

B) Perceived compatibility: The degree to which an innovation is perceived as consistent with existing values, past experiences, and needs of the receivers.

* Definitions of attributes are from Rogers and Shoemaker (1971), subattributes are drawn from diffusion literature.

Subattributes:

1. The innovation is congruent with the needs of the system. (Rogers & Shoemaker, 1971; Zaltman et al., 1977; Havelock et al., 1971; Orlosky & Smith, 1972; Hull & Kester, 1974)
2. If the innovation is completely congruent with existing practice, less change will occur. (Rogers & Shoemaker, 1971; Havelock & Huberman, 1978)
3. The innovation is consistent with the values and previous experiences of the group. (Rogers and Shoemaker, 1971; Hull & Kester, 1974; Orlosky and Smith, 1972; Havelock et al., 1971; Wolf & Fiorino, 1973; Holloway, 1975; Chin, 1974)
4. The innovation is accessible to members of the adopting unit. (Rogers & Shoemaker, 1971; Zaltman et al., 1977; Zaltman & Lin, 1971; Holloway, 1975)
5. Time and resources is made available for adopters to use the innovation. (McCutchen & Sanders, 1973; Wolf & Fiorino, 1973; Chin, 1974; Hull & Kester, 1974; Huberman, 1973)
6. Compatibility of the innovation ensures greater security, less risk to the recipient, (Rogers & Shoemaker, 1971; Chin, 1974; Huberman & Havelock, 1978; Holloway, 1975)
7. and bring about more participation in decision making. (Rogers & Shoemaker, 1971; Turnbull et al., 1974; Zaltman et al., 1977; Holloway, 1975; Huberman, 1973)

C) Perceived trialability: The degree to which an innovation may be experimented with on a limited basis.

Subattributes:

1. Opportunity is provided for small scale trial of the innovation. (Rogers & Shoemaker, 1971; Orlosky & Smith, 1972; Havelock, 1973; Robertson, 1971; Huberman, 1973)
2. Implies option of choice and less risk to individual considering adoption of the innovation. (Rogers & Shoemaker, 1971; Chin, 1974; Zaltman & Lin, 1971; Doyle et al., 1978; Helsel, 1972)

3. Experimentation on limited basis and installment plan effect. (Rogers & Shoemaker, 1971; Helsel, 1972; Orlosky & Smith, 1972; Hull & Kester, 1974; Chin, 1974)
4. Utilitarian value of the innovation is discovered through initial period. (Rogers & Shoemaker, 1971; Havelock, 1973; Zaltman et al., 1977; Havelock & Huberman, 1978)
5. Trial is part of the innovation-decision process which generally leads to one of two alternatives-to reject or adopt. (Rogers & Shoemaker, 1971; Havelock, 1973; Zaltman et al., 1977; Robertson, 1971)

D) Perceived complexity: The degree to which an innovation is perceived as relatively difficult to understand and use

Subattributes:

1. The innovation is difficult to understand, complicated, hard to use. (Rogers & Shoemaker, 1971; Chin, 1974; Hull & Kester, 1974; Zaltman et al., 1977; Huberman, 1973; Havelock et al., 1971; Helsel, 1972; Turnbull et al., 1974)
2. The innovation requires much change in procedure. (Rogers & Shoemaker, 1971; Zaltman et al., 1977; Havelock & Huberman, 1978)

E) Perceived observability: The degree to which the results of an innovation are visible to others.

1. The results of the innovation are visible, communicable to others. (Rogers & Shoemaker, 1971; Chin, 1974; Helsel, 1972; Huberman, 1973)
2. The innovation receives feedback from students and department with respect to its effects. (Helsel, 1972; Holloway, 1975; Pincus, 1974; Turnbull et al., 1974)

APPENDIX D

COVER AND FOLLOW-UP LETTERS ACCOMPANYING THE QUESTIONNAIRE

LETTER ACCOMPANYING THE QUESTIONNAIRE

Date: _____

Address: _____

Dear Dr. _____

I need your help to complete this phase of my doctoral dissertation in Educational Systems Development.

The intent of this study is to find out why innovative faculty of large universities, like yourself, adopt, maintain and/or reject instructional innovations.

I know that you had major responsibility for a project funded by Educational Development Program (EDP) related to

Project's Title

Would you please answer the questions in the attached document as they relate to your special project? Would you respond in terms of conditions prior to summer 1980, so that the current unsettled economic conditions do not influence your response.

To provide the necessary condition for complete candor on your part, anonymity will be maintained faithfully. The code numbers on the questionnaire will be removed immediately after its reception.

I have timed this document, and it takes approximately 15 minutes to complete. I know your time is very valuable, and be assured your response is deeply appreciated.

If you have any questions regarding this study please contact me at 355-0881 or Dr. Castelle G. Gentry at 353-0726. Thank you.

Sincerely,

Mahmood Moallemain
1414 F. Spartan Village
E. Lansing, Mich. 48823

FOLLOW-UP LETTER

Date: _____

Address _____

Dear Dr. _____

Some two weeks ago you received a request for your participation in a research project, the intent of which was/is to find out why innovative faculty of large universities, like yourself, adopt, maintain and/or reject instructional innovations.

Your participation in this university-wide study, was requested due to your major responsibility for a project funded by Educational Development Program (EDP) related to:

Project's Title

In view of the importance of your participation, your cooperation is again requested. I have enclosed another copy of the questionnaire, in case for any reason beyond your control the first one is misplaced and not handy. Please complete the questionnaire and forward it in the enclosed, self-addressed, stamped envelop by May 15, 1981. This deadline is necessary if the responses are to be analyzed and a report submitted by the end of this Spring term.

Please be assured again that the opinions of individual respondents and their departmental and college affiliation will remain completely anonymous throughout the study.

If you have any questions regarding this study please contact me at 355-0881 or Dr. Castelle G. Gentry at 353-0726. Thank you for your consideration and cooperation in this matter.

Sincerely,

Mahmood Moallemian
1414 F. Spartan Village
East Lansing, Mich 48823

LIST OF REFERENCES

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- Abedor, Allen J. Educational Development at Michigan State University: EDP, Michigan State University, East Lansing MI 1979.
- Abedor, A.J. and Sachs, S.G. "The Relationship Between Faculty Development (FD), Organizational Development (OD), and Instructional Development (ID): Readiness for Instructional Innovation in Higher Education" in Bass, R.K. and Lumsden, D.B. (eds.) Instructional Development: The State of the Art, Collegiate Publishing Co. Ohio, 1978.
- Alexander, Lawrence T. and Yelon, Stephen L. Instructional Development Agencies in Higher Education, Michigan State University, East Lansing, MI 1972. (ERIC ED 091997).
- Argyle, M. "The Social Psychology of Social Change" in Burns, T. and Saul, S.B. (eds.) Social Theory and Economic Change, London, Tavistock, 1967.
- Aslin and DeArman, in Donald C. Orlich, "Federal Educational Policy: The Paradox of Innovation and Centralization", Educational Researcher, July/August, 1979. pp.4-9.
- Babbi, Earl R. Survey Research Method, Wadsworth Publishing Co., Inc., Belmont, California: 1973.
- Baldrige, J.V. and Deal, T.E. (eds.) Managing Changing in Educational Organizations, Berkeley, CA: McCutchen, 1975.
- Beal, G.M., Rogers, E.M., & Bohlen, J.M. "Validity of the Concept of Stages in the Adoption Process" Rural Sociology, 1957, Vol. 22, No. 2, pp.166-168.
- Beckhard, R. Organization Development: Strategies and Models, Reading, Mass: Addison-Wesley, 1969.
- Bennis, W., Benne, K., Chin, R. and Corey, K. The Planning of Change, New York: Holt, Rinehart and Winston, 1976.

- Bennis, W.G. Changing Organizations, New York: McGraw Hill 1966.
- Berman, P. and McLaughlin, M.W. Federal Program Supporting Educational Change, Vol. VIII: Implementing and Sustaining Innovations. Santa Monica, CA: Rand Corporation. 1978.
- Bohla, H.S. Innovation Research and Theory, Columbia: School of Education, Ohio State University, 1965.
- Borg, W.R. and Gall, M.D. Education Research, Longman Inc., New York: 1979.
- Bratton, Barry, "Instructional Improvement Centers in Higher Education" in Bass, R.K. and Lumedon, D.B. (eds.) Instructional Development: The State of the Art, College Publishing Co., Ohio, 1978.
- Brown, G.I. "Operational Creativity: A Strategy for Teacher Change" Santa Barbara, CA: University of California. Presented at the meeting of the American Educational Research Association, at Chicago, IL. (February) 1966.
- Buhl, L.C. "A Personal Assessment of the State of Instructional Development" Educational Consulting Study Newsletter, 1975, January, 2-7.
- Carlson, R.O. "Strategies for Educational Change: Some needed Research on the Diffusion of Innovations", Paper presented to the conference on Strategies for Educational Change, Washington, D.C. No. 8-10, 1964.
- Carlson, R.O. Adoption of Educational Innovation, Eugene, Oregon: University of Oregon, 1965.
- Centra, J.A. "Faculty Development in the United States: Practices and Programs", Paper presented at the Second International Conference on Improving University Teaching, Heidelberg, Germany: July, 1976.
- Charters, W.W., Jr., Everhart, R.B., Jones, J.E., Packard, J.S., and Wacaster, C.T. The Process of Planned Change in the School's Instructional Organization. Eugene, Oregon: Center for the Advanced Study of Educational Administration, 1973.
- Chesler, M., Schmuck, R., and Lippitt, R. "The Principal's Role in Facilitating Innovation", Theory into Practice, Vol. 2, Dec. 1963. p.269
- Chin, R. "Applied Behavioral Science and Innovation Diffusion and Adoption", Viewpoints, May 1974, 50, pp.25-45.

- Coch, L. and French, J. "Overcoming Resistance to Change", Human Relations, Vol. 4 1948. pp.512-532.
- Cooke, R.A. and Zaltman, G. "Change Agents and Social System Change", Paper presented at American Educational Research Association Annual Meeting, Chicago, April, 1972. (ERIC ED 061 641)
- Cronbach, L. "Coefficient Alfa and the Internal Structure of Tests", Psychometrika, Vol.XVI, 1951. pp.297-334.
- Davis, John A. Instructional Improvement: An Assessment of Programs at Sixteen Universities, Information Futures, 2217 College Station, Pullman, Washington: 1978.
- Davis, Robert H., Abedor, Allen J. and Witt, Paul W.F. Commitment to Excellence: A Case Study of Educational Innovation, Michigan State University, East Lansing, MI: 1976.
- Diamond, R.M. "Instructional Development: Fact or Fiction?" Audiovisual Instruction, Vol. 16, No. 10, 1971. pp.6-7.
- Diamond, R.M., Eickmann, P.E., Kelly, E.F., Holloway, R.E., Vickery, T.R., and Pascarella, E.T. Instructional Development for Individualized Learning in Higher Education, Englewood Cliffs, N.J.: Educational Technology Publications, 1975.
- Doyle, Walter and Ponder, G.A. "The Practicality Ethic in Teacher Decision-Making". Interchange, Vol. 8, No. 3, 1977-78.
- Durzo, J.J. "The Organization and Implementation of Instructional Development Programs in Higher Education: A Review of Literature" in Bass, R.K. and Lumsden, D.B. (eds.) Instructional Development: The State of the Art, Collegiate Publishing Co., Ohio: 1978.
- Eicholz, G. and Rogers, Everett M. "Resistance to the Adoption of Audio-Visual Aids by Elementary School Teachers: Contrasts and Similarities to Agricultural Innovation", in Miles, M.B. (eds.) Innovation in Education, New York: Columbia University Teacher's College, 1964.
- Engel, D.J. A Study to Determine the Status of Instructional Development Programs within Institutions of Higher Education (Doctoral dissertation, Indiana University, 1969) Dissertation Abstracts International, 1970, 30 3185-A. (University Microfilm No. 70-193).

- Fantini, M. and Weinstein, G. "Strategies for Initiating Educational Change in Large Bureaucratic School Systems". Paper Presented to Public Policy Institute at Columbia University, Teachers College (April), 1963.
- Fliegel, F.C. and Kivlin, J.E. "Attributes of Innovation as Factor in Diffusion". The American Journal of Sociology, Vol. 72, No. 3, Nov. 1966. pp. 235-248.
- Ford Foundation, A Foundation Goes to School, New York: The Ford Foundation, 1972.
- Fullan, M. and Pomfret, A. "Research in Curriculum and Instruction Implementation" Review of Educational Research, Vol. 47, No. 2, 1977. pp. 335-397.
- Gaff, J.G. Toward Faculty Renewal, Jossey-Bass, Washington, D.C. 1975.
- Gaff, J.G. "New Approaches to Improve Teaching" in D.W. Vermilye, (eds.), Learner-Centered Reform. San Francisco: Jossey-Bass, 1975a.
- Gaynor, A.K., "The Study of Change in Educational Organizations: A Review of the Literature", in Cunningham, L., Hack, W. and Nystrand, R.O. (eds.) Educational Administration: The Developing Decades. Berkeley, CA: McCutchen, 1977.
- Gaynor, A.K. and DeVall, L. "The Dynamics of Educational Innovation: Theory and Practice", Paper Presented at the Annual Meeting of the American Educational Research Association, New York: April, 1977.
- Giacquinta, J.B. "The Process of Organizational Change in Schools", in Kerlinger, F.N. (ed.) Review of Research in Education. Itasca, IL.: Peacock. 1973.
- Goodlad, John I. and Klein, Frances M. Behind the Classroom Door, Worthington, Ohio: Charles A. Jones Publishing Co., 1970.
- Goodridge, C.G. Factors that Influence the Decision to Adopt an Innovation: IGE. Madison, WI: Wisconsin R and D Center, Technical Report No. 376. 1975.
- Greenwood, P.W., Mann, D. and McLaughlin, M.W. Federal Programs Supporting Educational Change, Vol. III, Santa Monica, CA: Rand, 1975.
- Greiner, L.E. "Antecedents of Planned Organizational Change", Journal of Applied Behavioral Science, Vol. 3, No. 1, 1967. pp. 50-85.

- Grimes, G.H., and Doyle, J. "Development, Design and the Process of Change in Education". Audiovisual Instruction, Vol. 16, No. 10, 1971. pp.53-55.
- Gross, N., Giacquinta, J. and Bernstein, M. An Attempt to Implement a Major Educational Innovation: A Sociological Inquiry, Cambridge, Massachusetts: Harvard University, Center for Research and Development on Educational Differences, 1968. (ERIC ED 032 649). pp.21-22.
- Gross, N., Giacquinta, J. and Bernstein, M. Complex Organizations: The Implementation of Major Organizational Innovations. Paper Presented to the American Sociological Association, Boston, Massachusetts: 1968. (ERIC ED 125 827)
- Gross, N., Giacquinta, J. and Bernstein, M. Implementing Organizational Innovations. New York: Basic Books, 1971.
- Gross, Ronald Diversity in Higher Education: Reform in the Colleges, The Phi Delta Kappa Educational Foundation, Bloomington, Indiana: 1976.
- Guba, Egon G. "Diffusion of Innovations", Educational Leadership, Vol. XXV, No. 4, (January) 1968. p.293.
- Guba, Egon, G. Methodological Strategies for Educational Change, Paper presented at the Conference on Strategies for Educational Change, Washington, D.C.: Nov. 1965.
- Hall, G.E., Loucks, S.F., Rutherford, W.L., and Newlove, B.W. "Level of Use of the Innovation: A Framework for Analyzing Innovation Adoption", The Journal of Teacher Education, Vol. 26, No. 1, 1975. pp.52-56.
- Hamrius, D.C. Toward a Definition of Instructional Development: An Organizational Approach. Paper presented at the annual meeting of the Division of Instructional Development of the Association for Educational Communications and Technology, Philadelphia: (March) 1971.
- Harris, Ben M. and Matula, Franklin U. Factors Contributing to the Willingness of Elementary Teachers to Try Selected Classroom Innovations, Bethesda, Maryland: ERIC Document Reproduction Service, ED 066 404, 1972.
- Havelock, Ronald G. et al., A Comparative Study of the Literature on Dissemination and Utilization of Scientific Knowledge. Ann Arbor, MI.: Center for Research on Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, Final Report, (July) 1969. ERIC ED 029 171. pp.10-30

- Havelock, R.G., Huber, J.D. and Zimmerman, S. Major Works on Change in Education: An Annotated Bibliography, Ann Arbor, MI: Institute for Social Research, Center for Research on Utilization of Scientific Knowledge, University of Michigan, 1969.
- Havelock, R.G., Girskin, A., Frohman, M., Havelock, M., Hill, M. and Huber, J. Planning for Innovation Through Dissemination and Utilization of Knowledge, Ann Arbor, MI: Institute for Social Research, Center for Research on Utilization of Scientific Knowledge, University of Michigan. 1971.
- Havelock, R.G. The Change Agent's Guide to Innovation in Education, Educational Technology Publication, New Jersey: 1973.
- Havelock, R.G. and Huberman, A.M. Solving Educational Problems, New York: Praeger Publications, 1978.
- Helsel, A.R. "Teachers' Acceptance of Innovation and Innovation Characteristics". The High School Journal, Nov. 1972. pp.67-76.
- Hilfiker, L.R. "Factors Relating to the Innovativeness of School Systems", The Journal of Educational Research, Vol. 64, No. 1, 1970. pp.43-45.
- Holloway, R.E. Perceived Attributes of an Innovation: Syracuse University Project Advance. Paper presented at the annual meeting of the AERA, Washington, D.C., ERIC Document # ED 103 980, 1975.
- Huberman, A.M. Understanding Change in Education: An Introduction. Geneva: International Bureau of Education, 1973.
- Hull, W.L., and Kester, R.J. Innovation Characteristics Critical to the Successful Adoption of Programs in School Settings. Paper presented at the annual meeting of AERA. (April) 1974.
- Isaac, S. and Michael, W.B. Handbook in Research and Evaluation, EDITS Publishers, San Diego, CA: 1971.
- Katz, E., Levin, M.L., and Hamilton, H. "Traditional of Research on the Diffusion of Innovation", American Sociological Review, Vol. 28, (April) 1963. pp.237-252.
- Kohl, J.W. "Adoption, Adoption Stage and Perceptions of the Characteristics of Innovation", California Journal of Educational Research, Vol. 20, (May) 1969. pp.120-131.

- Kritek, W.J. "Lessons from the Literature on Implementation", Educational Administration Quarterly, Vol. 12, No. 3, Fall 1976. pp.86-102.
- Lawrence, P.R. "How to Deal with Resistance to Change", Harvard Business Review, Vol. 32, No. 3, 1954. pp.49-57.
- Likert, Rensis "A Technique for the Measurement of Attitudes", Archives of Psychology, No. 140 (1932). p.38.
- Lionberger, H.F. Adoption of New Ideas and Practices. (5th edition) Ames: The Iowa State University Press, 1968.
- Lippitt, Ronald O. et al. "The Teacher as Innovator, Seeker and Sharer of New Practices", Perspectives on Educational Change. (eds.) R.I. Miller, New York: Appleton-Century Crofts, 1967. pp.307-324.
- Lippitt, R.O., Benne, K. and Havelock, R.G. "A Comparative Analysis of the Research Utilization Process", Paper presented at American Educational Research Association, Chicago, Ill. 1966.
- McCutchen, J.R. & Sanders, J.R. Diffusion Strategy Guide. Charleston, W.Va.: Application Educational Lab., Nov. 1973.
- Miel, Alice N. "Developing Strategies of Planned Curricular Innovation: A Review with Implications for Instructional Leadership", Strategies for Planned Curricular Innovation. ed. Marcella Lawler, New York: Teachers College Press. 1970. pp.156-159.
- Miles, M.B. "Planned Change and Organizational Health: Figure and Ground", in Change Process in Public Schools, Carlson, R.O. (eds.), The Center for the Advance Study of Educational Administration, University of Oregon, Eugene, Oregon: 1965.
- Miles, M.B. "Innovation in Education: Some Generalizations", in Innovation in Education, Bureau of Publications, Teachers College, Columbia University, New York: 1964.
- Mort, P.R. "Studies in Educational Innovation from the Institute of Administrative Research: An Overview", in M.B. Miles (ed.), Innovation in Education. New York: Teachers College, Columbia University, 1964.
- Murphy, R. and Appel, L. Evaluation of the Plate IV Computer-Based Education System in the Community College. Princeton, NJ: Educational Testing Service. 1977.

National Seminar on the Diffusion of New Instructional Materials and Practices: Perspectives on Diffusion Social Science Education Consortium, Inc., Boulder, Col., (June) 1973.

Oppenheim, A.N. Questionnaire Design and Attitude Measurement, New York: Basic Books, 1966, p.193.

Orlich, D.C. "Federal Educational Policy: The Paradox of Innovation and Centralization", Educational Researcher, July/August, 1979. pp.4-9.

Orlosky, D. and Smith, B.O. "Educational Change: Its Origins and Characteristics". Phi Delta Kappan, March 1972. pp.412-14.

Parker, C.A. "The Literature on Planned Organizational Change: A Review and Analysis", Higher Education. Vol. 9, (July) 1980. pp. 429-442.

Paul, D.A. "Change Processes at the Elementary, Secondary and Post-Secondary Levels of Education" in Nash, N. and Culbertson, J. (eds.), Linking Processes in Educational Improvement: Concepts and Applications. Columbus, Ohio: The University Council for Educational Administration, 1977. pp.7-73.

Pelavin, D., Johnston, D. and Shefter, J. An Analysis of the Achievements and Impacts of the Fund's Projects; Paper presented at AERA annual meeting, Boston, Massachusetts: (April) 1980. ERIC ED 185 677.

Pincus, J. "Incentives for Innovation in the Public Schools" Review of Educational Research. vol. 1, no. 44, 1971, pp.113-144.

Robertson, T.S. Innovative Behavior and Communication. New York: Free Press, 1971.

Rogers, E.M. and Shoemaker, F.F. Communication of Innovation: A Cross Cultural Approach, The Free Press, New York: 1971.

Rogers, E.M. Diffusion of Innovation, New York: The Free Press, 1962.

Rogers, E.M. and Thomas, C.D. Bibliography on the Diffusion of Innovation. Ann Arbor, MI: University of Michigan, Department of Population Planning, School of Public Health 1975.

- Roueche, J.E. and Boggs, J.R. The Educational Development Officer - A Change Catalyst for Two-Year Colleges. Durham, N. Carolina: Regional Education Laboratory for the Carolinas, 1970. (ERIC ED 043 317)
- Sarason, S.B. The Culture of the School and the Problem of Change. Boston: Allyn and Bacon, Inc., 1971.
- Schauer, C. "A Vice-President Looks at Instructional Development," Audiovisual Instruction, Vol. 16, No. 10, 1971. pp.43-45.
- Schramm, W. Big Media, Little Media. Washington D.C.: Academy for Educational Development, 1973.
- Scriven, Michael "The Methodology of Evaluation," Perspectives of Curriculum Evaluation, (ed.) Ralph W. Tyler, Robert M. Gagne, and Michael Scriven, Chicago: Rand, McNally and Co. 1967. p. 48.
- Stanford Research Institute: Evaluation of the National Diffusion network: Evolution of the network and Overview of the Research Literature of Diffusion of Educational Innovation. Menlo Park, CA: (January) 1976.
- Turnbull, B.J. et al., Promoting Change in Schools: A Diffusion Casebook. San Francisco: Far West Laboratory, 1974.
- Voegel, G.H. "The Innovative Diffusion Center: A Potential Concept to Accelerate Educational Change," Audiovisual Instruction. Vol.16, No.1, 1971. pp.67-69.
- Walker, Noojin "What a Great Idea Too Bad it Didn't Work" Educational Technology, Vol.16, No.2, (February) 1976. pp.46-47.
- Willowar, D.J. "Educational Change and Functional Equivalents," Educational and Urban Society. Vol.2, No.4, 1970. pp. 385-402.
- Willower, D.J., "The Teacher Subculture and Curriculum Change," Samplings, Vol. 1, April 1968.
- Wolf, W.C. & Fiorino, A.J. "Some Perspective of Educational Change", Educational Forum, Nov. 1973. pp.79-84.
- Yarger, S.J. and Mallon, J.T., "Articulating the Bits and Pieces for Product Change", Journal of Teacher Education. Vol. 25, Spring 1975. pp.12-18.
- Zaltman, G., Florio, D., and Sikorski, L. Dynamic Educational Change. The Free Press, New York: 1977.

Zaltman, G. and Lin, N. "On the Nature of Innovation", American Behavioral Scientist. Vol. 14, No. 5, 1971. pp.651-674.

Zander, A. "Resistance to Change: Its Analysis and Prevention", in Bennis, W.G., Benne, K.D. and Chin, R. (eds.) The Planning of Change. New York: Holt, Rinehart and Winston. 1961.

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